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THE COLOR COMPUTER MONTHLY MAGAZINE

July 1990

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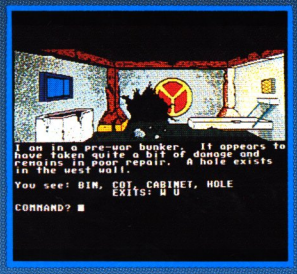
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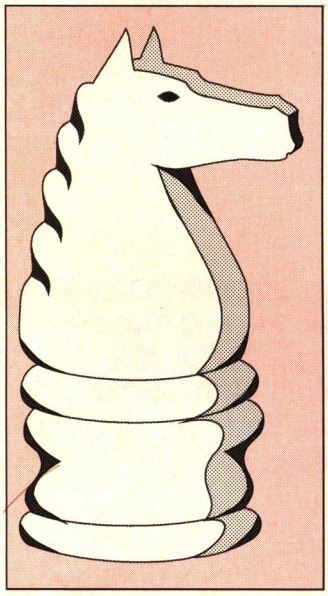

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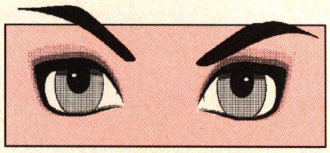

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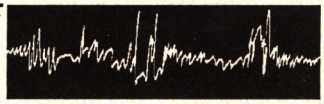

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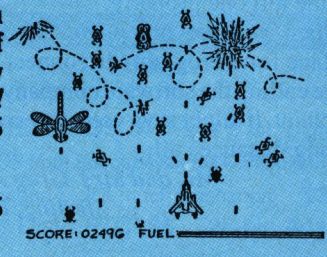

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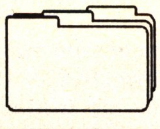

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Cover illustration by Heidi Nelson

Letters to the RAINBOW

One Little Quirk

Editor:

We bought *Label Designer* and *CoCo Graphics Designer Plus* from Zebra Systems at RAINBOWfest in Chicago. Both programs are excellent and do what they claim to do; however, we found one quirk. We could not get the pointer to access certain functions while it is on the screen. We called Zebra and talked to a technician there. He said the left joystick port or the digital/analog converter could be faulty. He suggested we write some BASIC code to see if the port could read all the possible values (0 through 63).

We also had the Tandy Hi-Res interface plugged in the right joystick port while we were using the programs. It states in the CoCo 3 manual that to read the left joystick port, a program must first read the right joystick port even if you aren't using it. Apparently having that interface plugged in at the same time messes up the ability to read the left one properly.

When you are not using the Hi-Res interface for a program, disconnect it first before calling the software company with a complaint. It might save you a few cents for the long distance call.

Mr. and Mrs. Greg Adams
Sterling, Illinois

How Much Memory?

Editor:

I have a simple question. Printed on the top of my CoCo 3 is 128K. When I type in `PRINT MEM` after I start up my system, the computer returns the number `22824`. Just how much memory do I have?

Deanna Andresen
Kernjvill, California

A common question with CoCoists. You have 22,824 bytes free for storage of BASIC programs. The rest is used for other features. Refer to "Barden's Buffer" (May 1990, Page 78) for more details.

Calendar Update

Editor:

One of my favorite printer programs is William J. Holdorf's *Calendar* (January '88), but I have always found it inconvenient to have to print twelve calendar diary pages at once.

To print a single sheet for a given month (1 through 12) in any year, delete lines 1320 and 1430, and enter the following lines into the listing:

```
1185 PRINT@352:PRINT@355,"WHAT M
ONTH (1-12): ";:INPUTMON1
1380 IFAN$="END"THEN1440
1760 FORMZ=MON1 TO MON1+2
1825 END
```

Keiran Kenny
Cremorne, Australia

Warning: Static Electricity

Editor:

Thank you for the help that I have received from reading THE RAINBOW over the last year. Everything from one-liners to machine language and OS-9 programs has taught me something.

I would also like to thank one of your advertisers, Dave Myers, who offered me some helpful advice concerning a 512K board purchased from another vendor. Inasmuch as it is possible that the first board was damaged by static electricity while I examined it, before installing it under static-free precautions, it would be most helpful if sellers of 512K boards would prominently display warnings on the packaging for the benefit of purchasers who are not electronics sophisticates.

David Baker
Athens, Georgia

Looking for a Good Book

Editor:

Recently, while rummaging around a pawn shop, I found a CoCo 2 system complete with a Multi-Pak Interface; Model 26-3024. The factory seal on the Multi-Pak had never been broken, so I went ahead and paid $10 for it. Which issues carry articles or letters about modifying that model Multi-Pak for use with the CoCo 3 and OS-9 Level II? Do the upgrades advertised in the magazine come with instructions? And what problems, if any, can I expect once the upgrade is complete?

(continued on page 94)

CIII Pages

by Walter Bayer

The *ultimate* **desktop publishing** program for the CoCo 3. Pull-down menus, icons & dialog boxes, drawing tools (create boxes, polygons, rays, circles, elipses, brush shapes), cut, copy, stamp, paste, zoom, flip, enlarge/reduce, rotate, stretch, undo, import any ASCII text, 2/3 columns & page preview. Includes 14 fonts & 60 pieces of clip art. Req. CoCo 3, RGB/ Monochrome Monitor, Min 1 drive, Tandy Hi-Res Interface, Joystick/mouse & DMP 105/106/Epson/Gemini & Compatible Printer. Only **$49.95**. w / Hires Inteface Only **$59.95.**

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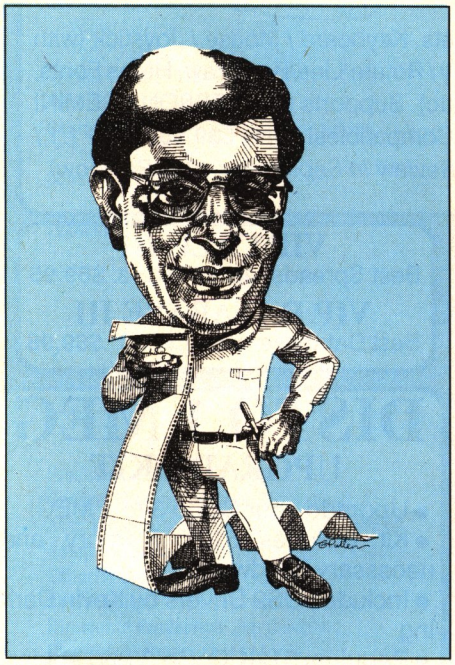

Happy Birthday CoCo and thank you, Barry Thompson.

This month's issue marks the ninth anniversary of THE RAINBOW and the beginning of our tenth year of service to the CoCo Community. It also comes at a time when some new, non-Tandy, options are becoming available to the CoCo Community and that, naturally, is a major plus for all of us who are totally enamored with the Color Computer, its abilities, capabilities and cost-effectiveness.

You will read more about this in Dale and Esther Puckett's upcoming book on the history of the Color Computer, which we will publish this fall, but the truth is it would be totally unfair to let this particular moment in time go by without thanking Barry Thompson for being the guiding force he has been in the development and continued support of the CoCo from its infancy through today.

It was January of 1982 when Barry and I met "for about 15 minutes" in the bar of the Las Vegas Hilton on the final day of the Consumer Electronics Show. He had promised his wife they would go off and do something she considered "fun" since he had spent the previous several days walking miles and miles through the convention hall looking at gadgets.

I was surprised when I met Barry. I had talked to him on the telephone one or two times, never for very long, and was expecting a hulking bear of a person. It took a moment to digest the thin guy in the cowboy boots was really him.

Our "about 15 minutes" seemed to expand into about four hours without being noticed by either of us. As it turned out, only the fact that he had a plane reservation back to Ft. Worth brought the "meeting" to a close. And Barry was "in trouble" — his wife never got to the "fun" part of the trip.

From what I hear from others, Barry was "in trouble" at other times, too, simply due to the fact he for years and years was among the major champions of the Color Computer, its peripherals, its software. Although Barry Thompson did not "design" the original CoCo, he oversaw changes which were made, planned enhancements, encouraged software developers by the carload and, even, some magazine publishers.

While what I have heard would make it unfair to say that Barry Thompson carried the torch alone without the help, encouragement and support of men such as John Roach, Tandy's president and CEO, and Bernie Appel, Radio Shack's president, it was Barry Thompson who kept the Color Computer a dynamic, growing, affordable computer system for hundreds of thousands of people for longer than any single computer system in history.

When Wayne Green, who used to publish a magazine called *80 Micro*, predicted early on in the CoCo's history that the computer would be scrapped, I called Barry Thompson and asked him about it. "As long as I have this job," he told me, "we will be building Color Computers." I wrote that Green was wrong. Barry still had his job years later. So, I was right.

Today Barry Thompson has assumed a new challenge directing the direct order software program for Tandy Corporation and the "new" Color Computer is a product of third party developers. They are all building on an owner base established by Barry Thompson through almost a decade during which his official title was "buyer" or "line manager" for CoCo.

Barry Thompson performed his job with dedication, brilliance, intelligence, foresight and an incredible understanding of what made and makes the CoCo Community tick. Although I coined the phrase "CoCo Community," Barry Thompson is its founder, father and guiding light.

Any one who has ever touched the keyboard of a Color Computer, whether to just "fool around," play a game, do real work or write programs, owes Barry Thompson an immeasurable debt of thanks. His job wasn't an easy one, but he did it with intense interest, real devotion, gentle good humor and won simply thousands of friends both in and out of Tandy Corporation in the process.

Thank you, Barry Thompson. From all of us.

— Lonnie Falk

...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

Word Power 3.3

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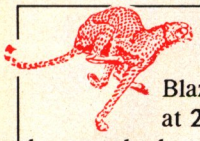

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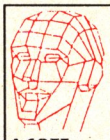
Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execution.



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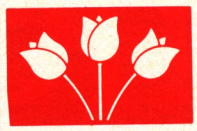
Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.

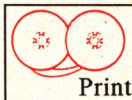


DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/ Composite/Monochrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make it a breeze to use!

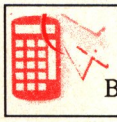
EDITING

Powerful full-screen editor w/ word-wrap. 4-way cursor,scrolling; Line Positioning; Block Commands; Search, Replace; OOPs recall during delete, adjustable key-repeat, key-click, typeahead, Tabs, Word-Count and much more! . Built-in extensive **HELP** screen can be accessed anytime during edit.



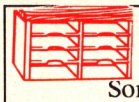
SPOOLER

Print and Edit documents at the same time!



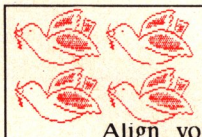
CALCULATOR

Built-in 4 function calculator!



SORTING

Sort lists in a flash!



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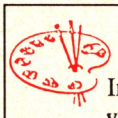
Align your text in 2 columns with a few keystrokes!

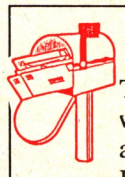


GRAPHICS

Insert **graphics** in your documents! Allows you to import PMODE 3/4, HSCREEN and CoCo Max II/III pictures!

SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!



MAIL MERGE

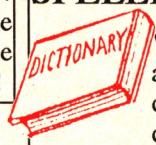
Type a letter, follow it with a list of names & addresses and have Word Power print out personalized letters. Its that easy!

SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

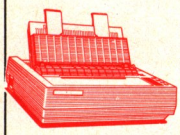
MACROS

Playback up to 250 keystrokes with a single key! Automate multiple tasks with a single key! You'll love it!



SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.

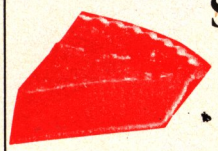


PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks, justification and more.

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, double-words, a/an usage, spaces and more. Its the perfect addition to any word-proccessor.



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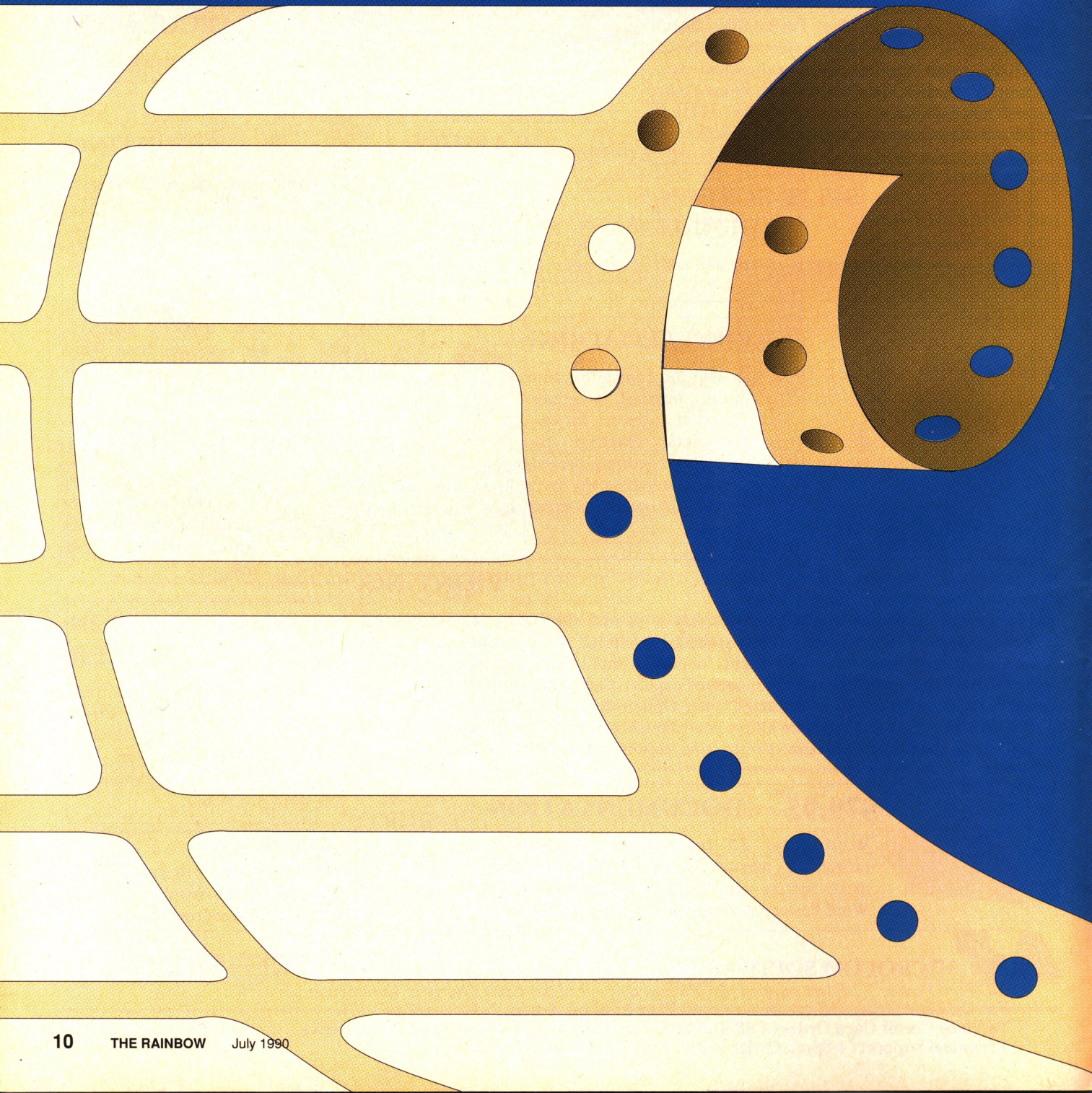
Handy Labeler

by Timothy W. Hart



Finally there's a handy labeling utility in a What-You-See-Is-What-You-Get (WYSIWYG) format. Many times I've wanted to make a quick and good-looking label for a variety of applications.

The most popular type of computer labels used today are the 3½-by-15/16 inches, one-across. These are easily pin-fed using the tractor-feed of dot-matrix printers. Even if your printer does not have a tractor-feed, I found out that you can effectively feed labels through the platen using only the friction feed of the printer. I originally wrote this program for my DWP-210 printer (for which I do not have a tractor-feed). The DWP-210 is a daisy-wheel printer.

In making Version 2.0, I removed the exclusivity of the program to the DWP-210 so that every RAINBOW reader can take advantage of *Label Maker*. Version 1.0 and 2.0 differ slightly in that 2.0 offers on-screen baud rate and tab settings. Version 2.0 makes some minor improvements over the already excellent Version 1.0.

Label Maker requires a minimum of a Color Computer 3, printer and one-across, 3½-by-15/16 inch, pin-feed labels. The program is extremely easy to use, with the most used menu selections displayed continuously on-screen. Most all dot-matrix printers default to their 10-pitch setting (pica) on startup, which is required by *Label Maker* since it is set up for 35 characters in each line and a maximum of five lines per label. If your dot-matrix printer does not default to pica on startup, you need to send the appropriate control codes to it. On daisy-wheel printers, make sure you have the appropriate 10-pitch print wheel installed. On other printers, just make sure they have a setting for 10-pitch (10 characters per inch) printing.

Visible Menu Selections

<S>TART LABEL
<E>DIT LABEL
<P>RINT

Invisible Menu Selections

<B>AUD	baud rate change
<T>AB	tab setting
<C>ENTER	global center
<1>-<5>	local line centering
<Q>UIT	exit program

Table 1: Command Reference

When you start *Label Maker*, you see below the title and credits a partitioned area of five lines in which to compose your label. Below that are the default baud rate and tab setting. Initially I have set up the printer for 1200 baud and the tab at two character positions.

Changing the Baud Rate

To change to default baud rate, simply press B on your keyboard. You hear a tone and the baud rate indicator moves up to the next setting (2400). Keep pressing B until you arrive at the desired baud rate. The baud rates supported by the program are 600, 1200, 2400, 4800 and 9600. If you press B when the current setting indicates 9600, the program cycles back to 600 baud.

Changing the Tab Setting

The next setting you will probably need to change for your particular setup is the tab setting. Initially the tab is set for two character positions. The function of the tab is to indent the number of user-defined spaces before printing the label. This feature is provided since labels can be fed into the printer at any location across the platen. You will have to experiment to find the tab setting that works best for you. To change the tab setting, simply press T, and underneath the menu a prompt appears asking you to enter the new tab setting. The allowable range for tab settings provided in this program are from 0 to 999. This should be more than sufficient for any need. After you set the new tab, the screen indicators just below the label work area display the current settings.

Building Your Label

Now we are ready to begin the label-making. Take a look at the menu selections. You have **<S>TART LABEL**, **<E>DIT LABEL** and **<P>RINT**. To begin working on a new label, press S. You hear a tone and the cursor is positioned on Line 1. At this point simply compose your label the way you want it to look. Don't worry about making mistakes; you can **<E>DIT** them later. After you have finished with Line 5, you are returned to the Main menu to begin the next phase of label production. The boundaries for your label composition are set up using brackets as delimiters. Within these brackets, you have 35 characters per line. After you have typed the 35th character the right bracket disappears. Do not type any more characters; just press ENTER. Only the first 35 characters entered onto a line are used.

Uppercase and Lowercase

Pressing SHIFT-0 toggles between upper- and lowercase while composing or

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Tim holds a bachelor's degree in computer science from Westminster College in Salt Lake City. He has been working with computers since 1980 and has especially enjoyed his long association with the Color Computer. When not working with his computers, he enjoys photography, classical music and reading. He may be contacted at 7146 Watermill Way, Salt Lake City, UT 84121.

editing your label. If you are in uppercase, you are toggled to lowercase and vice versa. *Label Maker* can be placed into lowercase mode at the menu with only one keystroke. When you press the CLEAR key at the menu, there is a tone, and the menu selections automatically toggle from one case to the other. This is handy when you want to start your label in any particular case. You then know with which case you are currently working before you press S to start your label. The program indicates what the case was when you finished your last label line and returned to the menu.

You must use SHIFT-0 when you are typing or editing your label. Only use the CLEAR key to toggle the case at the menu. To do so elsewhere in the program does exactly what that key was intended for — it clears the screen. If you accidentally press CLEAR when not at the menu, press BREAK and re-run the program.

Editing the Label

If you made a mistake or want to redo one or more of the lines in your label, press E at the menu. A prompt appears below the menu, asking you which line you want to edit. Enter a number from 1 to 5. You are now in the Edit mode of the program. You can see the editing window directly below the label area itself. The first line of the window indicates which line you are currently editing. The next line displays a copy of the line to be edited. Below that is a blank line in which you can recompose the line in the label. Simply retype that line and press ENTER when you are finished. You can immediately see the editing window disappear and the change you made appears in the label area. You may edit as many of the lines as you want and each line as many times as you want until you get the desired result.

Centering the Label

A special feature in *Label Maker* is its ability to center text on a label. This is an extremely useful feature. There are two modes of operation when centering your label: You have the choice between a global center or a local center. If you want to have every line of the label centered, you should use the global feature. To globally center your label, press C at the menu. You are prompted if you want to center all lines. Press Y and your label is automatically centered. Press N if you accidentally pressed C or changed your mind. If you try to globally center the label after the fact, the program prompts you to let you know that the label is already centered. To locally center your label, press the corresponding number key for the line you want centered.

For example, if you want to center line

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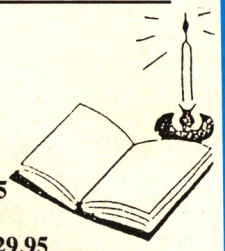

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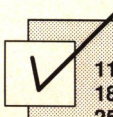
numbers 1, 3 and 5, press 1, then 3, then 5. The indicator is placed around those line numbers. Once a line is centered, you cannot center it again. If you attempt to press 1 after you have already centered that line, the program tells you that the line is already centered. If you make a mistake in centering or do not like the results, you can always edit the individual lines in question and then locally center them again. In other words, global centering centers all of the lines in the label after pressing C at the menu, whereas centering only centers those lines for which you press the appropriate numerical key.

Printing Your Creation

When you are ready to print your label, press P at the menu. You are prompted for the number of copies you want. Enter the appropriate number and press ENTER. Your printer proceeds to print your labels. The program automatically provides a linefeed between labels so the printer is at the proper position for the next label. To abort the Print function after invoking it, simply enter 0 for the number of labels and you are returned to the menu.

When your label-making session is complete, press Q at the menu. You are asked if you are sure. If you are, press Y and the program ends execution by cold-starting the system. ❑

CoCo 3



110 113	205 225	602 108
180 85	211 107	604 133
250 154	304 5	609 97
310 153	310 54	614 37
340 58	315 37	620 232
370 209	321 183	703 148
1010 59	502 38	803 120
2000 94	513 252	END 127

The Listing: LABEL

```
0 ' COPYRIGHT 1990 FALSOFT, INC
10 'The WYSIWYG Label Maker V.2
20 'By Timothy W. Hart
30 'June 26, 1988/Version 1.0
40 'June 22, 1989/Version 2.0
50 '(C) 1989 Falsoft, Inc.
60 '
70 '
80 POKE65497,0:CLEAR500:WIDTH40
90 POKE 150,87:BD=1200:'set init
ial baud rate (600 at double clo
ck speed = 1200 baud)
100 TB=2:'set initial TAB
110 POKE&H11A,&HFF:'force upperc
ase
120 UC=1:'set upper/lower case f
lag on
130 CLS3
140 PALETTE0,63:PALETTE8,0
150 ATTR0,0
160 C$="
                ":'clear line arr
ay
170 U$="
                 ":'underline str
ing
180 FOR C=1 TO 24:PRINT"":NEXTC
190 LOCATE0,0:PRINT"<><><><>The
WYSIWYG  Label Maker<><><><>";
200 LOCATE0,1:PRINT"<><><><><> B
y Timothy W. Hart <><><><><>";
210 LOCATE0,2:PRINT"<><><><><><>
<>  (C) 1989  <><><><><><><>";
220 LOCATE0,3:PRINT"<><><><><><>
 Falsoft,  Inc. <><><><><><>";
230 PRINT"<><><><><><><><><><><>
<><><><><><><><><>";
240 LOCATE0,5:ATTR0,0,U:PRINTU$;
:ATTR0,0
250 GOSUB3000
260 LOCATE0,13:ATTR0,0,U:PRINTU$
;:ATTR0,0
270 GOSUB4000
280 LOCATE0,14:PRINT"BAUD =";BD;
290 IF TB<10 THEN LOCATE31,14:PR
INT"  TAB =";TB;:ELSE IF TB<100
THEN LOCATE31,14:PRINT" TAB =";T
B;:ELSE LOCATE31,14:PRINT"TAB ="
;TB;
300 IF UC=1 THEN LOCATE18,19:ATT
R0,0,U:PRINT"MENU";:ATTR0,0 ELSE
 LOCATE18,19:ATTR0,0,U:PRINT"men
u";:ATTR0,0
310 IF UC=1 THEN LOCATE0,21:PRIN
T"<S>TART LABEL / <E>DIT LABEL /
 <P>RINT ? ";:ELSE LOCATE0,21:PR
INT"<s>tart label / <e>dit label
 / <p>rint ? ";
320 I$=INKEY$
330 IF I$=CHR$(12) THEN IF UC=1
THEN SOUND220,1:SOUND210,1:SOUND
200,1:POKE&H11A,0:UC=0:GOTO280 E
LSE SOUND200,1:SOUND210,1:SOUND2
20,1:POKE&H11A,&HFF:UC=1:GOTO280
340 IF I$="S" OR I$="s" THEN CF=
0:C1=0:C2=0:C3=0:C4=0:C5=0:LOCAT
E1,22:PRINTI$;:PLAY"L64EA":GOSUB
 4000:GOSUB 3000:GOSUB 1000:IF P
EEK(&H11A)=&HFF THEN UC=1:GOTO28
0 ELSE UC=0:GOTO280
350 IF I$="E" OR I$="e" THEN GOS
UB 2000:IF PEEK(&H11A)=&HFF THEN
 UC=1:GOTO280 ELSE UC=0:GOTO280
360 IF I$="P" OR I$="p" THEN GOS
UB 5000:GOTO280
370 IF I$="C" OR I$="c" THEN GOS
UB 6000:GOSUB3000:GOTO280
380 IF I$="1" OR I$="2" OR I$="3
" OR I$="4" OR I$="5" THEN GOSUB
 6000:GOSUB3000:GOTO280
390 IF I$="B" OR I$="b" THEN GOS
UB 7000:GOTO280
400 IF I$="T" OR I$="t" THEN GOS
UB 8000:GOTO290
410 IF I$="Q" OR I$="q" THEN GOS
UB 9000:GOTO280
420 GOTO320
430 '
1000 '<B>EGIN LABEL
1010 GOSUB4000
1020 LOCATE4,7:LINEINPUTL$(1):L$
(1)=LEFT$(L$(1),35):GOSUB3000
1030 LOCATE4,8:LINEINPUTL$(2):L$
(2)=LEFT$(L$(2),35):GOSUB3000
1040 LOCATE4,9:LINEINPUTL$(3):L$
(3)=LEFT$(L$(3),35):GOSUB3000
1050 LOCATE4,10:LINEINPUTL$(4):L
$(4)=LEFT$(L$(4),35):GOSUB3000
1060 LOCATE4,11:LINEINPUTL$(5):L
$(5)=LEFT$(L$(5),35):GOSUB3000
1070 RETURN
1080 '
2000 '<E>DIT LABEL
2010 LOCATE1,22:PRINT"Edit which
 line ";:INPUT LI
2020 IF LI=0 THEN LOCATE 1,22:PR
INTC$;:GOTO 280
2030 IF LI<1 OR LI>5 THEN LOCATE
 19,22:PRINT"
 ";:GOTO 2010
2040 LOCATE0,14:PRINT"
    Edit Line #";LI
2050 LOCATE3,16:PRINT"[":LOCATE4
,16:PRINTL$(LI);:LOCATE39,16:PRI
NT"]";
2060 LOCATE3,17:PRINT"[":LOCATE3
9,17:PRINT"]":LOCATE4,17:LINEINP
UTL$(LI)
2070 LOCATE0,22:PRINTC$:'clear o
ut prompt
2080 IF LI=1 THEN C1=0 ELSE IF L
I=2 THEN C2=0 ELSE IF LI=3 THEN
C3=0 ELSE IF LI=4 THEN C4=0 ELSE
 IF LI=5 THEN C5=0
2090 CF=0
2100 L$(LI)=LEFT$(L$(LI),35)
2110 GOSUB3000
2120 LOCATE0,14:FORX=1TO5:PRINTC
$:NEXTX:'clear out editor lines
2130 RETURN
2140 '
3000 'LIST LABEL
3010 IF CF=0 AND C1=0 THEN LOCAT
E0,7:PRINT" 1 ";:ELSE IF CF=1 OR
 C1=1 THEN LOCATE0,7:PRINT">1<";
3020 LOCATE3,7:PRINT"["
3030 LOCATE4,7:PRINTL$(1);:LOCAT
E39,7:PRINT"]";
3040 IF CF=0 AND C2=0 THEN LOCAT
E0,8:PRINT" 2 ";:ELSE IF CF=1 OR
 C2=1 THEN LOCATE0,8:PRINT">2<";
3050 LOCATE3,8:PRINT"["
3060 LOCATE4,8:PRINTL$(2);:LOCAT
E39,8:PRINT"]";
3070 IF CF=0 AND C3=0 THEN LOCAT
```

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WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```
E0,9:PRINT" 3 ";:ELSE IF CF=1 OR
 C3=1 THEN LOCATE0,9:PRINT">3<";
3080 LOCATE3,9:PRINT"["
3090 LOCATE4,9:PRINTL$(3);:LOCAT
E39,9:PRINT"]";
3100 IF CF=0 AND C4=0 THEN LOCAT
E0,10:PRINT" 4 ";:ELSE IF CF=1 O
R C4=1 THEN LOCATE0,10:PRINT">4<
";
3110 LOCATE3,10:PRINT"["
3120 LOCATE4,10:PRINTL$(4);:LOCA
TE39,10:PRINT"]";
3130 IF CF=0 AND C5=0 THEN LOCAT
E0,11:PRINT" 5 ";:ELSE IF CF=1 O
R C5=1 THEN LOCATE0,11:PRINT">5<
";
3140 LOCATE3,11:PRINT"["
3150 LOCATE4,11:PRINTL$(5);:LOCA
TE39,11:PRINT"]";
3160 IF LEN(L$(5))=35 THEN 3170
ELSE 3210
3170 LOCATE0,12:PRINTC$;
3180 LOCATE0,13:ATTR0,0,U:PRINTU
$;:ATTR0,0
3190 LOCATE0,14:PRINT"BAUD =";BD
;
3200 IF TB<10 THEN LOCATE31,14:P
RINT"  TAB =";TB;:ELSE IF TB<100
 THEN LOCATE31,14:PRINT" TAB =";
TB;:ELSE LOCATE31,14:PRINT"TAB =
";TB;
3210 RETURN
3220 '
4000 'CLEAR LABEL LINE VARIABLES
4010 L$(1)="":L$(2)="":L$(3)="":
L$(4)="":L$(5)=""
4020 RETURN
4030 '
5000 '<P>RINT LABEL
5010 LOCATE1,22:PRINT"Quantity t
o print ";:INPUTQ:IF Q<0 THEN LO
CATE21,22:PRINT"
 ";:GOTO 5010:ELSE IF Q=0 THEN L
OCATE1,22:PRINTC$;:GOTO 280
5020 LOCATE1,22:PRINTC$;
5030 LOCATE1,22:PRINT"Ready prin
ter, press <ENTER>";:EXEC&HA171
5040 LOCATE1,22:PRINTC$;:LOCATE1
,22:PRINT"Printing. . .";
5050 FOR I=1 TO Q
5060 PRINT#-2,TAB(TB)L$(1)
5070 PRINT#-2,TAB(TB)L$(2)
5080 PRINT#-2,TAB(TB)L$(3)
5090 PRINT#-2,TAB(TB)L$(4)
5100 PRINT#-2,TAB(TB)L$(5)
5110 PRINT#-2,"":'linefeed to re
ady next label
5120 NEXT I
5130 LOCATE1,22:PRINTC$;
5140 RETURN
5150 '
6000 '<C>ENTER LABEL LINES
6010 IF CF=1 THEN LOCATE1,22:PRI
NT"Label centered.  Press <ENTER
>";:EXEC&HA171:LOCATE1,22:PRINTC
$;:RETURN
6020 IF (I$="1" AND C1=1) OR (I$
="2" AND C2=1) OR (I$="3" AND C3
=1) OR (I$="4" AND C4=1) OR (I$=
"5" AND C5=1) THEN LOCATE1,22:PR
INT"Line centered.  Press <ENTER
>";:EXEC&HA171:LOCATE1,22:PRINTC
$;:RETURN
6030 IF I$="C" OR I$="c" THEN IF
 (CF=0) AND (C1=0 AND C2=0 AND C
3=0 AND C4=0 AND C5=0) THEN LOCA
TE1,22:PRINT"Want all lines cent
ered (Y/N) ";:INPUTW$:ELSE RETUR
N
6040 IF W$="N" OR W$="n" THEN LO
CATE1,22:PRINTC$;:RETURN
6050 LOCATE1,22:PRINTC$;
6060 IF I$="1" OR I$="2" OR I$="
3" OR I$="4" OR I$="5" THEN CL=V
AL(I$):ELSE GOTO 6080
6070 ON CL GOTO 6090,6120,6150,6
180,6210:'switch to center lines
 1,2,3,4,or 5
6080 CF=1:'set center (all) flag
 on
6090 LT$="":LG=LEN(L$(1)):IF (LG
>0) AND (LG<35) THEN IN=(INT(35-
LG)/2):FOR SP=1 TO IN:LT$=LT$+"
":NEXT SP:L$(1)=LT$+L$(1)
6100 C1=1:'set line 1 center fla
g on
6110 IF CF=0 THEN RETURN
6120 LT$="":LG=LEN(L$(2)):IF (LG
>0) AND (LG<35) THEN IN=(INT(35-
LG)/2):FOR SP=1 TO IN:LT$=LT$+"
":NEXT SP:L$(2)=LT$+L$(2)
6130 C2=1:'set line 2 center fla
g on
6140 IF CF=0 THEN RETURN
6150 LT$="":LG=LEN(L$(3)):IF (LG
>0) AND (LG<35) THEN IN=(INT(35-
LG)/2):FOR SP=1 TO IN:LT$=LT$+"
":NEXT SP:L$(3)=LT$+L$(3)
6160 C3=1:'set line 3 center fla
g on
6170 IF CF=0 THEN RETURN
6180 LT$="":LG=LEN(L$(4)):IF (LG
>0) AND (LG<35) THEN IN=(INT(35-
LG)/2):FOR SP=1 TO IN:LT$=LT$+"
":NEXT SP:L$(4)=LT$+L$(4)
6190 C4=1:'set line 4 center fla
g on
6200 IF CF=0 THEN RETURN
6210 LT$="":LG=LEN(L$(5)):IF (LG
>0) AND (LG<35) THEN IN=(INT(35-
LG)/2):FOR SP=1 TO IN:LT$=LT$+"
":NEXT SP:L$(5)=LT$+L$(5)
6220 C5=1:'set line 5 center fla
g on
6230 RETURN
6240 '
7000 '<B>AUD RATE CHANGE
7010 IF BD=9600 THEN BD=600 ELSE
 BD=BD*2
7020 IF BD=600 THEN POKE150,180
7030 IF BD=1200 THEN POKE150,87
7040 IF BD=2400 THEN POKE150,41
7050 IF BD=4800 THEN POKE150,18
7060 IF BD=9600 THEN POKE150,7
7070 PLAY"L64C"
7080 RETURN
7090 '
8000 '<T>AB SETTINGS
8010 LOCATE1,22:PRINT"Enter new
TAB ->";:INPUT TB
8020 IF TB<0 OR TB>999 THEN LOCA
TE 19,22:PRINT"
  ";:GOTO8010
8030 LOCATE0,22:PRINTC$:'clear o
ut prompt
8040 TB=INT(TB)
8050 RETURN
8060 '
9000 '<Q>UIT (exit) PROGRAM
9010 LOCATE1,22:ATTR0,0,B:PRINT"
Are you sure (Y/N) ";:INPUTQ$
9020 IF Q$="Y" OR Q$="y" THEN PO
KE113,0:EXEC40999:ELSE ATTR0,0:L
OCATE1,22:PRINTC$;:RETURN
```

DISTO PRODUCTS

All Disto Products now carry a 1-Year Warranty and are shipped **2nd Day Air** (at no extra charge!) within Continental US. All Disto Add-Ons (& Super Controller II) include OS9 Drivers, unless otherwise specified.

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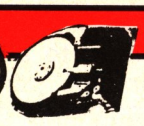

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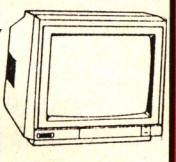

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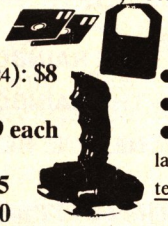

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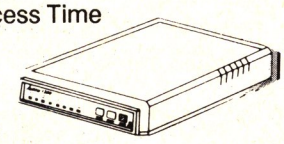

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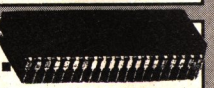

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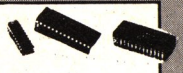

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UPS 2ND DAY AIR

Son of Perplexing Puzzles

by William Barden, Jr.
Contributing Editor

Last year about this time I ran a series of brain teasers that could be easily solved by CoCo BASIC programs. Columns like this are always well received, especially since the disappearance of Martin Gardner's "Mathematical Recreations" column in *Scientific American*. The premise in that article is that many brain teasers can be solved by the power of the CoCo, letting it do the grunt work of slogging through test cases. Some of you may think this is cheating, but I have another view. Many complex mathematical puzzles have been solved by the use of high-speed computers. One example is the four-color map problem: Can four colors color a map of world countries? A computer solved the puzzle by going through all possible permutations.

This month's column presents eight more puzzles for the computer. CoCo programs of two to twenty-four lines of BASIC code do the trick. I also present a special challenge puzzle for you determined hackers out there, with a cash prize for the best answer!

Puzzle 1: Coin Toss

The CoCo easily simulates a coin toss. Just use a 0 for heads and a 1 for tails and a binary number with the number of bits equal to the number of tosses. For example, the eight-bit binary number 01101110 represents tosses from 1 to 8 (left to right) for: heads, tails, tails, heads, tails, tails, tails and heads. ANDing with 128 gives you the head or tail bit for the first toss; ANDing with 64 gives you the head or tail bit for the second toss, etc.

Here's the question: You may think there is an equal number of heads and tails about 50 percent of the time. Is this true? If not, about what percentage of the time will eight tosses result in four heads and four tails?

Coin Toss Solution

This is our old friend the permutation, which you may have seen previously in this column. In a permutation, order is important, unlike a combination in which there is no order. If eight coin tosses are represented by a string of eight bits, the possible ways the tosses can come out are given by the binary numbers from 00000000 through 11111111:

00000000	all heads
00000001	one tail
00000010	one tail
00000011	two tail
00000100	one tail
.	.
.	.
10101001	four tails, four heads
10101010	four tails, four heads
.	.
.	.
11111100	six tails
11111011	seven tails
11111110	seven tails
11111111	eight tails

You can see from the above that all heads or all tails come out only one time each in 256 possible toss permutations. But what about an equal number of heads and tails? The solution is to count the heads and tails in each of the 256 permutations. A short program for this is shown in Listing 1.

The program first fills Array C with the binary values from 00000000 (Decimal 0) through 11111111 (Decimal 255). It then goes through each of the 256 entries in the array and counts one bit by ANDing each bit position. If CT=4 at the end of each count operation, the number of tails equals 4 and the number of heads equals 4, and there are an equal number of heads and tails. Running this program prints 27.45 percent as the probability of an equal number of heads and tails, much less than the 50 percent you might have imagined. The complete list of percentages is:

Percentage of		
all tails	=	0.39
one	=	3.14
two	=	10.98
three	=	21.96
four	=	27.45
five	=	21.96
six	=	10.98
seven	=	3.14
all heads	=	0.39

Notice that the distribution of heads and tails is symmetrical about the four/four value, as you might expect.

Puzzle 2: Making a Buck

I love the *Saturday Night Live* commercial about the New York Change Bank — you know, the one that's only in business to make change. They make their money on volume dealing. And that poses a question: Using pennies, nickels, dimes, quarters and half dollars, just how many ways are there to make change for a dollar? Fifty? Seventy-five? Let your CoCo figure it out.

Making a Buck Solution

Surprisingly, there are 292 distinct ways to make a buck. The three-line program shown in Listing 2 shows the brute force code that uses five loops to change pennies, nickels, dimes, quarters and half dollars. There are 21*21*11*5*3=72,765 possible configurations. Each configuration is checked to see if the total coins add up to $1. If so, the current number of each coin is

---

Bill Barden has written 35 books and hundreds of magazine articles about small computers . His newest Color Computer book is "Connecting the CoCo to the Real World", a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.

printed in the order of pennies, nickels, dimes, quarters and half dollars.

Puzzle 3: Easy as Pi

Calculus and I just don't see eye to eye. However, I found the computation of pi on the CoCo absurdly easy. Suppose you have a circle plotted as shown in Figure 1. The graph of a circle of radius one centered at the origin is represented by $x^2 + y^2 = 1$.

The graph uses x as the horizontal axis and y as the vertical axis. For example, if x=0, then the equation reads $0 + y^2 = 1$, making y either plus or minus 1. If y=0, then the equation is $x^2 + 0 = 1$, making x either plus or minus one. Intermediate values are calculated the same way.

Given this circle formula, can you program a way to find the area of the circle? Since the radius is one, the area of the circle should be equal to pi*r*r or pi in this special case of radius one.

Easy as Pi Solution

One way to find the area is to cut the circle into thin vertical segments as shown in Figure 1 and then total the area of individual segments. x is varied from -1 to 1 in small steps. We used .001 sized steps, an arbitrary number. For each step, the height of the segment is twice the value of y, which can be found by taking the square root of 1-x*x. The width of each segment is .001. Adding up the area of each segment gives you the area of the circle, or pi. The answer is 3.14155614, a fast and (fairly) accurate computation of the constant.

If you got the answer, congratulations, you've just completed a problem in integral calculus! My version of the program to do this integration is shown in Listing 3.

Puzzle 4: Hacker's Disease

One problem plaguing the CoCo community is an irritating but non-deadly disease called Hacker's Disease. It's a toss-up whether the disease was named after CoCo freaks or from its discoverer, Thomas J. Hacker. Hacker's Disease is characterized by a ravaging thirst, numb fingers and a seemingly insatiable hunger for Twinkies while sitting at a CoCo keyboard.

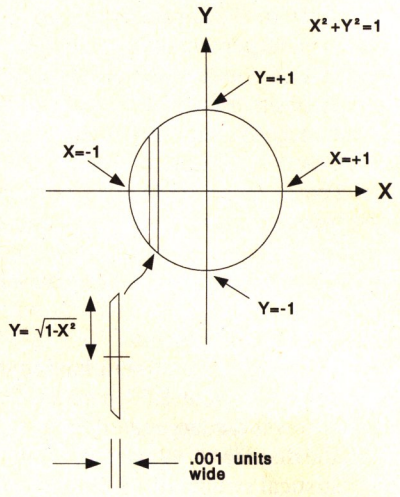

Figure 1

Hacker's Disease infects about one percent of the CoCo community — about

William Barden Jr.
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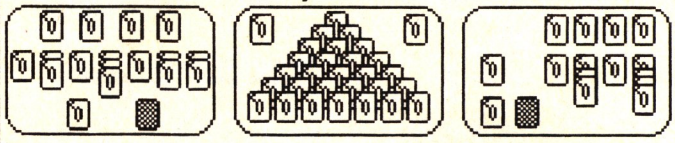

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100,000 sorry individuals. Because of this widespread infection THE RAINBOW contacted the NCDC (National Center for Diehard CoCobuffs) and had them design a diagnostic test for the disease. The test is 90 percent accurate. That is, when given to a CoCo user with Hacker's Disease, the test is positive in 90 percent of the cases. When given to a CoCo user without the disease, the test is positive only 10 percent of the time and negative in 90 percent of the cases. A random sample of 1000 users is tested. Ten of these 1000 users have the disease (one percent). If you are diagnosed as having Hacker's Disease by the test, what are the odds that you actually have it?

Hacker's Disease Solution

Incredibly, the odds of your having the disease are only about 8.33 percent. The reason for this is the large number of users without the disease — 99 percent of them. In the statistical sample of 1000 users, 990 do not have the disease, but because of the test error, about 10 percent of these have positive results (about 99 users). Of the 10 users who have the disease, about 9 test positive, and one diseased user is missed. This example has analogies for real, rather than imagined, disease testing. Even with a fairly high accuracy in a test, there will be many people falsely testing positive.

To validate these results, run the program shown in Listing 4. It first establishes a sample size of 1000, setting all 1000 users to 0 (no disease). Ten users are then set randomly to 1 (diseased). All 1000 users are then tested, using the 90 percent accuracy of the test. If the RND command returns a value less than 9, the test is simulated as valid; if greater than 9, the test is simulated as invalid. (Variable RE is set to 0 if the test is valid or to 1 if the test is invalid.) Variables NC and CO are used to count the number of well people testing positive and the number of diseased people testing positive; the results are then printed:

```
Well people diagnosed with disease: 91
Sick people diagnosed with disease: 9
```

The numbers for the results vary, depending upon your system.

Puzzle 5: Stacking Cannonballs

My hometown has a typical war memorial commemorating the great Yuppie Uprising of 1987. Like many other towns, there's a large cannon in the square with a stack of cannonballs next to it. The cannonballs are stacked in several levels. The bottom level has nine balls, three to a side. Another level of four cannonballs are stacked in the four depressions created by this first level. The top cannonball is stacked in the single depression created by the second level, making three levels of nine balls, four balls and one ball, respectively, for a total of 14 balls. Every year the cannonballs are unstacked, cleaned, repainted and restacked. This year the town derelict, a former Amiga user, observed the maintenance and posed a question. Is there any number of cannonballs that can be unstacked and then placed in a perfect square in one level? For example, a square of ten-by-ten balls makes a perfect square of 100 balls, but when restacked they cannot be restacked perfectly. There is one ball on top, followed by four balls on the next level, followed by nine balls on the next level, followed by 16 balls on the next level, followed by 25 balls on the next level, followed by 36 balls on the next level, with 19 balls left over (see Figure 2). Try this with up to 10,000 cannonballs and you may have an answer. My CoCo program takes eight lines to compute the result.

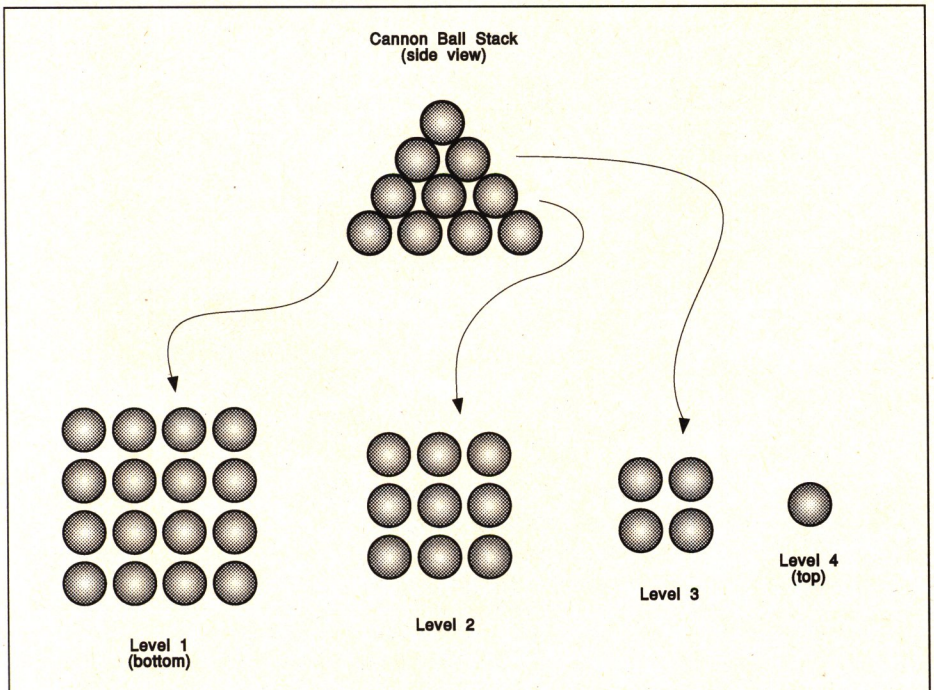


Figure 2

Stacking Cannonballs Solution

There are really two parts to this puzzle. The first part computes the square number, using the number of balls on a side of the square. Squares of 1, 2, 3, 4, 5 and 6, for example, have 1, 4, 9, 16, 25 and 36 balls in the square. The total number of balls are perfect square numbers.

The second part needs a way to compute the total number of balls in the cannonball stack. For one level, the number of balls is 1. For two levels, the number of balls is 1 + 4 or 5. For three levels, the number of balls is 1 + 4 + 9 or 14. The number of cannonballs is actually the sum of these square numbers for all levels considered. The secret here is the formula for computing the total number of balls:

$$\text{total balls in stack} = (n(n+1)(2n+1))/6$$

where n is the number of balls on one side of the bottom layer. This formula is not obvious but can be found by mathematicians with a technique known as induction. With the formula things are a lot easier, as shown in Listing 5. Just construct two tables: NC, number of cannonballs in stack and NS, number of cannonballs in a square for sides of 1 through 100. Then scan both tables, looking to see if the total number of balls in any stack entry match any perfect square value. If so, there's a stack that contains the exact number of balls as found in a perfect square. The answer here is a stack of 1 or 70 balls on a side. The 70 case results in a square of 4900 balls, which can also be stacked as 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256, 289, 324, 361, 400, 441, 484, 529 and 576 balls in 24 levels — quite a stack!

Puzzle 6: Take a Meeting

The executive council of the BBCUG (Buffalo Breath, Wyoming CoCo Users Group) meets once a month. It always has

a great deal of difficulty with its five officers. Ed hates Bill and the two of them won't meet together. Likewise, Sue and Mary won't be seen together. Complicating it further, Mary likes Ed and will only show up if he is there. Since Mary is the recording secretary, she must be there. Three people must be present to conduct business. Lastly, Jan can only meet on Sundays. Are there any combinations of members and meeting days that provide for at least three members in a monthly meeting?

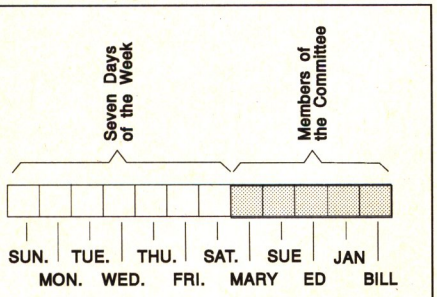


Figure 3

Take a Meeting Solution

One way to handle this is with a table of all possible configurations. Suppose we have 12 bits in each table entry, as shown in Figure 3. The first seven bits represent days of the week, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday, from left to right. There can only be one day for the meeting, so possible day configurations are:

```
1000000XXXXX
0100000XXXXX
0010000XXXXX
0001000XXXXX
0000100XXXXX
0000010XXXXX
0000001XXXXX
```

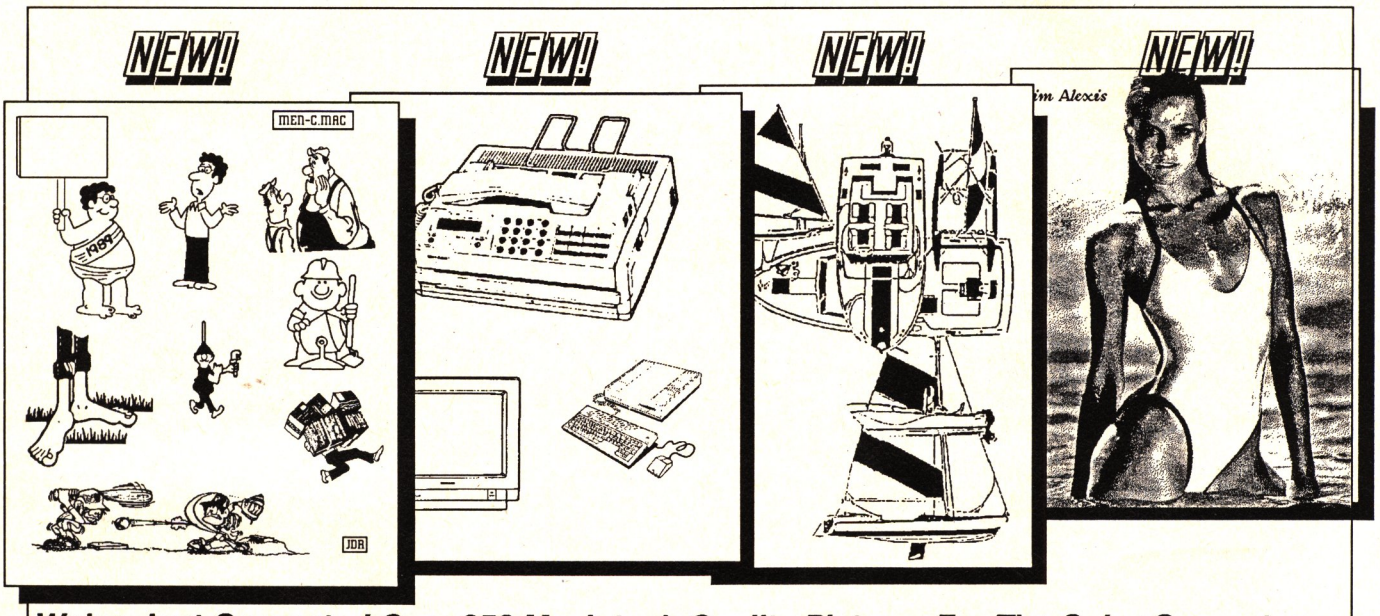
The next five bits represent Mary, Sue, Ed, Jan and Bill, in that order from left to right. Now all possible configurations for each meeting day are the values of 00000 through 11111, 32 in all. The value 10100, for example, would indicate Mary and Ed are present.

The table of entries consist of 7*32=224 entries. Now, some of these entries are invalid and must be crossed off. Test each condition and do so. The remaining entries are valid entries.

Listing 6 shows a program to construct a table and then to cross off entries. The first check tests whether Ed and Bill are present (`AND 5`). All entries that have both Ed and Bill (XXXXXXXXX1X1) are deleted from the table by setting them to 0 (see Listing 6). The next check tests whether Mary and Sue are present (`AND 24`) and deletes any such entries. The next check tests to see if Mary is present and Ed is not present (`AND 16` and `AND 4`). For all such cases, the entry is deleted. The next check tests to see if Mary is present and deletes all entries in which Mary is not there (`AND 16<>16`). The next check counts all members, putting the count in Variable `CT`. If the count does not equal 3 or greater, the entry is deleted. The final check tests whether Jan is present and the day is not a Sunday (`AND 2048`). All such entries are deleted. All entries not reset to 0 are then printed. In this case, there is one entry left, a value of 2070, indicating a meeting Sunday with Mary, Ed and Jan present (100000010110).

Puzzle 7: Faro Shuffle

Faro shuffles are used by magicians specializing in card tricks, among other things. A Faro shuffle is a precise card shuffle that interweaves cards from two halves of a deck precisely to position cards in the deck. One version of a Faro shuffle



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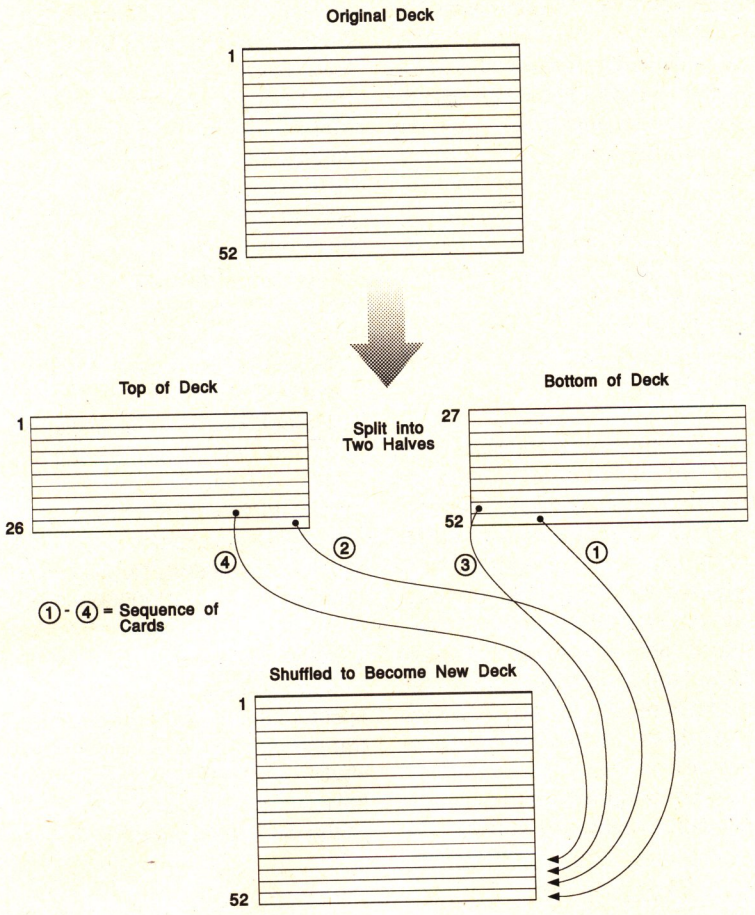

Figure 4

works as follows (see Figure 4). The card deck is separated into two halves, a top and bottom half. The deck is a 52-card deck with the cards numbered 1 to 52, top to bottom. The top half holds the original cards 1 through 26, and the bottom half holds the original cards 27 through 52. The deck is then shuffled so one card from each half falls alternately, starting with the bottom card of the bottom half.

Assuming that we know the original starting positions of the cards, in how many Faro shuffles will the card deck be restored to its original order? Or will it?

Faro Shuffle Solution

Incredibly, the card deck is restored in only eight Faro shuffles. To show this, run the program in Listing 7. It starts with a randomized card deck in CA. The DATA statement values correspond to random ordering of cards 1 through 52.

The middle segment of code simulates a Faro shuffle from the CA array into the NW array. At the end of the shuffle, the NW array holds the shuffled deck, which is then copied back to the CA array. The deck is printed before shuffling begins and then at the end of eight shuffles. Try putting in an intermediate print if you don't believe the ordering.

Puzzle 8: Sum of Digits

In how many ways can nine digits be written in three three-digit rows so that they add up to the proper result? The rows look like this:

```
  1 2 3
  4 5 6
  -----
  7 8 9
```

Sum of Digits Solution

Listing 8 shows the answer to this puzzle. It uses nine variables to represent each of the nine digit positions in the three-by-three matrix. Each variable is cycled through a range of 1 through 9. A value of 0 indicates that the end of the range has been reached.

The three-by-three matrix is processed as if it were stretched out in a straight line. Digit positions are processed from left to right. Processing for each digit position bumps the digit to the next one (3 to 4, for example) and then checks to see that no higher digit position has already used that number. If it has, the next number is used. When a valid digit is found, processing for the next lower digit position is called, which repeats a similar action. The chain ends at the digit position defined by P9. If the sum of P1-P2-P3 and P4-P5-P6 then add up to P7-P8-P9, the nine digit position values are valid and printed. If the configuration is not valid, only a bar is printed. Valid digit configurations are also sent to a disk file.

This program takes over 20 hours to run, and I pose a challenge to the reader: Can you speed it up? If so, send me a new version and we'll publish it!

Reader Challenge

And now for the *piece de resistance* of this column, the reader challenge. Take the Ace, King, Queen and Jack of Hearts, Clubs, Diamonds and Spades and arrange them in a four-by-four matrix so that no value or suit appears more than once in any row, column or two diagonals. One example of this is shown in Table 1.

Q-H	K-C	J-D	A-S
J-S	A-D	Q-C	K-H
A-C	J-H	K-S	Q-D
K-D	Q-S	A-H	J-C

J=Jack Q=Queen K=King
A=Ace H=Hearts C=Clubs
D=Diamonds S=Spades

Table 1

The best program to accomplish this will win $50,000,000 Micro Dollars. (Micro Dollars are the computer currency traded at the Fort Worth Currency Exchange. One U.S. dollar equals about 1,000,000 Micro Dollars.) The program will also be published in this column in THE RAINBOW, providing it is short enough. Send your entries to:

William Barden, Jr.
Post Office Box 3568
Mission Viejo, CA 92692

That's it for this column. Have fun working these puzzles. See you next month with more CoCo topics. ❑

Listing 1: COINTOSS

```
100 ' COIN TOSS
110 DIM C(255)
120 FOR I=0 TO 255: C(I)=I: NEXT
130 CT=0: PT=0
140 FOR I=0 TO 255
145 CT=0
150 IF (C(I) AND 256)=256 THEN C
T=CT+1
160 IF (C(I) AND 128)=128 THEN C
T=CT+1
170 IF (C(I) AND 64)=64 THEN CT=
CT+1
180 IF (C(I) AND 32)=32 THEN CT=
CT+1
190 IF (C(I) AND 16)=16 THEN CT=
CT+1
200 IF (C(I) AND 8)=8 THEN CT=CT
+1
210 IF (C(I) AND 4)=4 THEN CT=CT
+1
220 IF (C(I) AND 2)=2 THEN CT=CT
+1
230 IF (C(I) AND 1)=1 THEN CT=CT
+1
240 IF CT=4 THEN PT=PT+1
250 NEXT
260 PRINT "% OF EQUAL HEADS AND
TAILS="; (PT*100/255)
```

Listing 2: MAKEBUCK

```
100 ' CHANGING A DOLLAR
110 FOR P=0 TO 100 STEP 5:FOR N=
0 TO 20:FOR D=0 TO 10:FOR Q=0 TO
 4:FOR H=0 TO 2
120 IF P+N*5+D*10+Q*25+H*50=100
THEN CNT=CNT+1: PRINT P;N;D;Q;H;
CNT
130 NEXT:NEXT:NEXT:NEXT:NEXT
```

Listing 3: EASYASPI

```
100 ' EASY AS PI
110 FOR X=-1 TO 1 STEP .001:Y=SQ
R(1-X*X):A=A+2*Y*.001:NEXT:PRINT
 A
```

Listing 4: HACKER

```
100 ' HACKER'S DISEASE
110 DIM P(1000)
120 FOR I=1 TO 1000: P(I)=0: NEX
T
130 P(13)=1: P(213)=1: P(500)=1:
 P(717)=1: P(861)=1
140 P(17)=1: P(134)=1: P(381)=1:
 P(816)=1: P(978)=1
150 FOR I=1 TO 1000
160 IF RND(10)<=9 THEN RE=0 ELSE
 RE=1
170 IF P(I)=0 THEN IF RE=0 THEN
NO=NO+1
180 IF P(I)=0 THEN IF RE=1 THEN
YS=YS+1: NC=NC+1
190 IF P(I)=1 THEN IF RE=1 THEN
NO=NO+1
200 IF P(I)=1 THEN IF RE=0 THEN
YS=YS+1: CO=CO+1
210 NEXT I
220 PRINT "WELL PEOPLE DIAGNOSED
 WITH DISEASE:"; NC
230 PRINT "SICK PEOPLE DIAGNOSED
 WITH DISEASE:"; CO
```

Listing 5: CANNON

```
100 ' CANNONBALLS
110 DIM NC(100), NS(100)
120 FOR I=1 TO 100
130 NC(I)=(I*(I+1)*(2*I+1))/6
140 NS(I)=I*I
150 NEXT
160 FOR I=1 TO 100: A=NC(I): FOR
 J=1 TO 100: IF A=NS(J) THEN PRI
NT "BASE OF CANNONBALL STACK IS"
; I ; "BY"; I; ",SQUARE ON GROUN
D IS"; SQR( NS(J) ); "ON A SIDE"
170 NEXT: NEXT
```

Listing 6: MEETING

```
100 ' THE MEETING
110 DIM M(224)
120 FOR W=1 TO 7
130 WD=INT(2^(7-W+5))
140 FOR J=0 TO 31
150 M((W-1)*32+J+1)=WD+J
160 NEXT J: NEXT W
170 FOR I=1 TO 224: IF (M(I) AND
 5)=5 THEN M(I)=0
180 NEXT
190 FOR I=1 TO 224: IF (M(I) AND
 24)=24 THEN M(I)=0
200 NEXT
210 FOR I=1 TO 224: IF (M(I) AND
 16)=16 THEN IF (M(I) AND 4) <>
4 THEN M(I)=0
220 NEXT
230 FOR I=1 TO 224: IF (M(I) AND
 16)<>16 THEN M(I)=0
240 NEXT
250 FOR I=1 TO 224
260 CT=0
270 IF (M(I) AND 16)=16 THEN CT=
CT+1
280 IF (M(I) AND 8)=8 THEN CT=CT
+1
290 IF (M(I) AND 4)=4 THEN CT=CT
+1
300 IF (M(I) AND 2)=2 THEN CT=CT
+1
310 IF (M(I) AND 1)=1 THEN CT=CT
+1
320 IF CT<3 THEN M(I)=0
330 NEXT
340 FOR I=1 TO 224: IF (M(I) AND
 2)=2 THEN IF (M(I) AND 2048) <>
 2048 THEN M(I)=0
350 NEXT
360 FOR I=1 TO 224: IF M(I)<>0 T
HEN PRINT M(I);
370 NEXT
```

Listing 7: SHUFFLE

```
100 ' FARO SHUFFLE - INTERSPERSE
 CARDS FROM TWO HALVES - OUT SHU
FFLE
110 DIM CA(52), NW(52)
120 DATA 6,33,45,37,41,3,25,23,5
,49,36,27,50,16,48,29,34,38,17,8
,28,22,2,39,26
130 DATA 12,24,18,51,15,19,46,21
,11,35,13,7,31,9,42,43,47,10,44,
51,30,1,52,40
140 DATA 20,14,15
150 FOR I=1 TO 52: READ CA(I): N
EXT
160 FOR I=1 TO 52: PRINT CA(I);:
 NEXT: PRINT
170 FOR J=1 TO 8
180 PRINT "SHUFFLE #:"; J
200 FOR I=26 TO 1 STEP -1:NW(I*2
)=CA(26+I): NW(I*2-1)=CA(I): NEX
T
210 FOR I=1 TO 52: CA(I)=NW(I):
NEXT
220 NEXT
230 FOR I=1 TO 52: PRINT CA(I);:
 NEXT: PRINT
```

Listing 8: SUMDIGIT

```
100 ' SUM OF DIGITS MATRIX
110 P1=0: P2=0: P3=0: P4=0: P5=0
: P6=0: P7=0: P8=0
120 OPEN "O", #1, "RESULTS"
130 P1=P1+1: IF P1=10 THEN CLOSE
: STOP
140 P2=P2+1: IF P2=10 THEN P2=0:
 GOTO 130 ELSE IF P2=P1 THEN GOT
O 140
150 P3=P3+1: IF P3=10 THEN P3=0:
 GOTO 140 ELSE IF P3=P2 OR P3=P1
 THEN GOTO 150
160 P4=P4+1: IF P4=10 THEN P4=0:
 GOTO 150 ELSE IF P4=P3 OR P4=P2
 OR P4=P1 THEN GOTO 160
170 P5=P5+1: IF P5=10 THEN P5=0:
 GOTO 160 ELSE IF P5=P4 OR P5=P3
 OR P5=P2 OR P5=P1 THEN GOTO 170
180 P6=P6+1: IF P6=10 THEN P6=0:
 GOTO 170 ELSE IF P6=P5 OR P6=P4
 OR P6=P3 OR P6=P2 OR P6=P1 THEN
 GOTO 180
190 P7=P7+1: IF P7=10 THEN P7=0:
 GOTO 180 ELSE IF P7=P6 OR P7=P5
 OR P7=P4 OR P7=P3 OR P7=P2 OR P
7=P1 THEN GOTO 190
200 P8=P8+1: IF P8=10 THEN P8=0:
 GOTO 190 ELSE IF P8=P7 OR P8=P6
 OR P8=P5 OR P8=P4 OR P8=P3 OR P
8=P2 OR P8=P1 THEN GOTO 200
210 P9=P9+1: IF P9=10 THEN P9=0:
 GOTO 200 ELSE IF P9=P8 OR P9=P7
 OR P9=P6 OR P9=P5 OR P9=P4 OR P
9=P3 OR P9=P2 OR P9=P1 THEN GOTO
 210
215 IF P9<>P3+P6 THEN GOTO 310
220 C1=0:C2=0:C3=0
230 C3=P3+P6: IF C3>=20 THEN C3=
C3-20: C2=2 ELSE IF C3>=10 THEN
C3=C3-10: C2=1
240 C2=C2+P2+P5: IF C2>=20 THEN
C2=C2-20: C1=2 ELSE IF C2>=10 TH
EN C2=C2-10: C1=1
250 C1=C1+P1+P4: IF C1>=10 THEN
GOTO 310
260 IF C1<>P7 OR C2<>P8 OR C3<>P
9 THEN GOTO 310
270 PRINT#1,P1,P2,P3,P4,P5,P6,P7
,P8,P9
280 PRINT P1;P2;P3
290 PRINT P4;P5;P6
300 PRINT P7;P8;P9
310 PRINT "-"
320 GOTO 210
```

Error - Trapping Troubles

by Larry Boeldt

Dear Larry:

I am having trouble with error-trapping routines in some programs. For example, one of my programs has the following lines:

```
10 ON ERR GOTO 300
.
. (main program)
.
300 IF ERNO=26 THEN PRINT"INSERT
THE CORRECT DISK AND PRESS ANY K
EY":EXEC 44539:RUN
```

The program entirely ignores the PRINT *statement and skips to the* EXEC 44539 *statement. Why does this happen, and how can I fix it? Also, what is* X=RND(-TIMER) *supposed to do? I have seen this in several program listings.*

Dan Crosby
Eagle, Idaho

The problem you are experiencing is easy to fix. Simply store ERNO in a variable in Line 300 and process the routine with the variable. Let me show you, using your example:

```
10 ON ERR GOTO 300
.
. (main program)
.
300 ER=ERNO
301 IF ER=26 THEN PRINT"INSERT T
HE CORRECT DISK AND PRESS ANY KE
Y":EXEC 44539:RUN
```

Color BASIC requires this procedure for error trapping in order to process error-handling routines correctly.

As for X=RND(-TIMER), this statement in theory resets the random number generator in BASIC to help it generate a new set of random numbers. Color BASIC always uses the timer value to set random numbers. By setting the selection value to the logical opposite of TIMER, BASIC becomes "tricked" into resetting the random number generator. (This procedure does not really change the pattern that much, though.)

Run the following program twice for a demonstration of how well the statement works. The second time you run it, remove Line 20. Notice a less predictable pattern in the second run.

```
10 FOR X=1 TO 20
20 R=RND(-TIMER)
30 PRINT RND(30)
40 NEXT X
```

After running the program four or five times each way and comparing them, I concluded that there is not much difference in the two patterns (at least not enough to appear truly random). As a result, I decided to try a different approach and came up with an even more unpredictable pattern. Try the following routine:

```
10 FOR X=1 TO 20
20 R=INT(RND(-TIMER)*30)
30 PRINT R
40 NEXT X
```

Joystick in Hi-Res

Dear Larry:

I am 13 years old and have a CoCo 3, one disk drive, a DMP-130 printer and a Multi-Pak Interface. I was working on some programs that use the HSCREEN 2 command and came across the problem of trying to use a joystick to move an object placed in a box. Can you give me a short program that explains this concept better?

Joel W. Carmichael
Pine Bush, New York

I assume you won't be using a Hi-Res interface for your joystick. For starters, keep in mind that HSCREEN 2 is a 320-by-192 screen. Your joystick can produce values from 0 to 63 (64 actual values) both horizontally and vertically; therefore you must use the following formulas:

```
10 DEF FNH(J)=JOYSTK(J)*5 ' HORI
ZONTAL MEASURE (J=0 OR J=2)
20 DEF FNV(J)=JOYSTK(J)*3 ' VERT
ICAL MEASURE (J=1 OR J=3)
```

Notice the remarks at the end. If you want to call the horizontal position of the right joystick, JOYSTK(0), and store the value in H, use H=FNH(0). Please note that every fifth horizontal pixel and every third vertical pixel is accessed. Pinpoint accuracy is not possible with these formulas; however, the formulas allow your joystick to cover roughly the whole screen.

He's Dreaming of an Alphabetized Christmas List

Dear Larry:

I have written a short program as a names and numbers file for Christmas cards or general mailing list. The program is enclosed (with the letter) for you to examine. Do you know of a way to get the program to sort the names alphabetically? The program is not fancy, but I have grown accustomed to it and it's a hassle to have to delete and retype names when I add a new name to the file. Any help would be greatly appreciated.

David Moore
Rapid City, South Dakota

While studying the Pascal programming language, many of my assignments required sorting routines. It was up to us to choose a routine suitable for our program. For your program a sort called the Quick Sort would be best because of the large number of names you might be processing. I decided instead to include a listing for the Bubble Sort with a short explanation of how it

---

Larry Boeldt has programmed on the Color Computer for five years. He has experience with BASIC, Pascal and FORTRAN IV. He runs a software customizing business for the CoCo market.

works as a lesson for all you BASICally Speaking fans. I chose the Bubble Sort because it is very easy to understand. Plus I think I have a pretty good analogy for explaining the theory of operation.

Let's pretend that each letter of the alphabet has a certain weight. For instance, the letter A has a weight of air, the letter Z has the weight of heavy sand. All other letters have weights suiting their position in the alphabet. Now, each letter is put into a jar of water. The jar is covered and jostled until the letters are all mixed up and disorganized. The jar is then placed down and nature "sorts" the individual letters by their weight. Therefore the letter A bubbles to the top while the letter Z drops to the bottom; this continues until all the different weights have been settled. A Bubble Sort operates under the same theory in that the names with the lowest ASCII values float to the top while those with the highest sink to the bottom. Without being overly critical of the analogy, you should now understand the theory of the bubble sort.

Disabling the Reset Button

Dear Larry:

I was wondering if you knew of any pokes for disabling the Reset button on the CoCo 3? If so what are they? I'd also like to know how I can find a copy of EDTASM+ *on cassette. The people at Radio Shack say they don't have any such assembler. If you know of one, how much would it cost me and where can I get it? Does it require any patches?*

Russel Morton
Lawrence, Kansas

Let me answer your second question first. There is a version of *EDTASM+* that works with tape systems, but it is on a ROM Pak. This cartridge is available through Radio Shack's Express Order Software system. Call (800) 321-3133. I do not think there are any patches for the program since it is all in ROM.

As for your second question, see the listing below and simply merge these lines into your program:

```
410 '
412 ' RESET PROTECTION
415 '
420 POKE 114,1:POKE 115,&HD1
421 FOR I=&H1D1 TO &H1D9:READ A$
:POKE I,VAL("&H"+A$):NEXT I
422 DATA 12,1A,50,7F,FF,DF,7E,C0
,E7
423 '
```

❑

16K

The Listing:

```
1000 ' Bubble Sort
1020 '
1030 ' This routine will sort the elements of array A$()
1040 ' into ascending alphabetical order (A-Z). It is
1050 ' assumed that A$() is full of names to be sorted.
1060 '
1070 ' Variables
1075 '
1080 ' A$()= An array of 200 names (be sure to DIM(200))
1090 ' NE= Number of elements used in the array
1100 ' CO= Counter for sort loop
1110 ' FL= Flag.variable to see if more sorting is necessary. 0=no / 1=yes
1130 ' T$= Temporary string
1140 ' PO= Tells how many names are in place
1199 '
1200 FL=0
1210 FOR CO=PO TO NE-1
1220 IF A$(CO)<A$(CO+1) THEN 1270  ' Are elements in order?
1230 FL=1                          ' Sorting needs to be done.
1240 T$=A$(CO)                     ' Exchange the variables.
1250 A$(CO)=A$(CO+1)
1260 A$(CO+1)=T$
1270 NEXT CO                       ' Move on to next element.
1275 IF FL=1 THEN 1200             ' If sorting done, run loop again.
1280                               ' RETURN or GOTO as appropriate.
```


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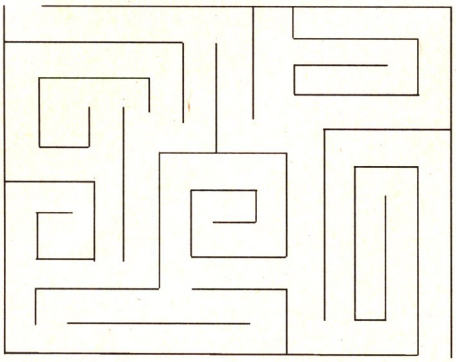
A game in which you play the role of a data communications chip

Just Between Terminals

by Jeff Steidl

Data Transfer is a combination action/strategy game in which you become a data communications chip. The program draws two CoCos on opposite sides of the screen; one of the computers tries to transmit data to the other. The transmitting computer has a series of numbers next to it. The idea is to go through the maze of computer circuitry, collect the data by moving on top of it, and go back through the maze with the data to the other computer. When you accomplish this, you gain a number of points equal to the time remaining on the clock. If you fail to accomplish the transfer before time is up, the game is over.

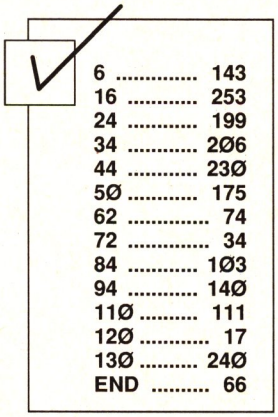


As you travel through the maze, three blue lightning-shaped negative charges attempt to zap you or block off your path. For every successful data transmission another blue negative charge appears. You aren't defenseless, however. You can fire white, star-shaped positive charges at them to cancel the charges, giving you 20 points. The number of positive charges you have is indicated by the number of them drawn next to your score at the top of the screen. You get an extra positive charge every 500 points. But beware, you must be moving when you fire to give it direction. If it doesn't have a direction, it lands on you. This is deadly. If you fire the positive charge and it misses the negative one, the positive charge wanders around. Wandering charges prevent you from firing other charges and are also deadly to you, so remember to avoid them as you do negative

---

Jeff Steidl spends much of his time writing BASIC and assembly language programs as well as designing computer systems and languages. He has eight years of programming experience, ranging from the MC-10 to the VAX. Jeff's other interests include mathematics, music and electronics. He may be contacted at 605 Evergreen Drive, Holmen, WI 54636.

16K Standard



```
6 ..... 143
16 ..... 253
24 ..... 199
34 ..... 206
44 ..... 230
50 ..... 175
62 ..... 74
72 ..... 34
84 ..... 103
94 ..... 140
110 ..... 111
120 ..... 17
130 ..... 240
END ..... 66
```

The Listing: DATATRAN

```
0 ' COPYRIGHT 1990 FALSOFT, INC
2 CLS:PRINT@8,"DATA TRANSFER":PR
INT@104,"BY JEFF STEIDL":PRINT@1
66,"PRODUCED IN 1989 &":PRINT@19
8,"MADE IN THE U.S.A.":PRINT@453
,"(SETTING UP MEMORY)"
4 POKE65495,0:CLEAR200,13069:DIM
M(15,8):FORA=13210TO13307:READB:
POKEA,B:NEXT:EXEC13266
6 FORA=0TO6:READA(A),B(A):NEXT:F
ORA=0TO36:READB:D=A*32:FORC=1TO6
:E=INT(B/7):POKEC+D+13856,A(B-E*
7):POKE15039-C-D,B(B-E*7):B=E:NE
XT:POKE13856+D,63:POKE13863+D,19
2:POKE13887+D,252:POKE13880+D,3:
NEXT
8 POKE14372,253:POKE14436,254:PO
KE14819,19:POKE14523,127:POKE144
59,191:POKE14076,196
10 FORA=0TO2048STEP256:READB,E:F
ORC=0TO14STEP2:IFB-INT(B/2)*2THE
NPOKEA+C+14080,255:POKEA+C+14081
,255:POKE14110-C+A,255:POKE14111
-C+A,255
12 IFE-INT(E/2)*2THENFORD=A TOA+
256STEP32:POKED+C+14081,PEEK(D+C
+14081)OR3:POKE14109-C+D,PEEK(14
109-C+D)OR3:NEXT
14 B=INT(B/2):E=INT(E/2):NEXT:NE
XT
16 FORA=14087TO14343STEP64:POKEA
,255:POKEA+17,255:NEXT
18 FORA=0TO24STEP2:FORB=0TO192ST
```

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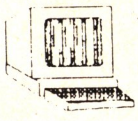

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Data Transfer works on any CoCo with at least 16K, but you may need to make some small modifications. If you have 32K or more, change the CLEAR 200,16383 in Line 90 to CLEAR 200,32767. If you have a CoCo 3, change the POKE 65495,0 at the beginning of Line 4 to POKE 65497,0 and change the POKE 65494,0 in Line 90 to POKE 65496,0. If your CoCo cannot handle the ROM speed-up poke, delete the POKE 65495,0 at the beginning of Line 4. Any CoCo with Extended Color BASIC needs a PCLEAR1: added to the beginning of Line 4.

Data Transfer uses the artifact colors on the PMODE 4 screen. On a CoCo 1 or 2 you may have to press the Reset button if you don't want the blue and the orange mixed around. The game is in black and white if you are using an RGB monitor. If you want color on an RGB, you can change the 248 in Line 142 to 224. The colors are then correct except the background is green instead of black. ❑

```
EP32:READC:POKEA+B+13347,C/32:PO
KEA+B+13348,C*8-INT(C/32)*256:NE
XT:NEXT
20 FORA=0TO10STEP2:FORB=0TO192ST
EP32:READC:POKEA+B+13600,C/64:PO
KEA+B+13601,C*4-INT(C/64)*256:NE
XT:NEXT
22 FORA=0TO8STEP2:FORB=0TO192STE
P32:READC:POKEA+B+13864,C/64:POK
EA+B+13865,C*4-INT(C/64)*256:NEX
T:NEXT
24 FORA=0TO9:READA(A):NEXT:FORA=
0TO138STEP2:READB:POKEA+13070,A(
B/10):POKEA+13071,A(B-INT(B/10)*
10):NEXT
26 FORB=0TO8:FORA=0TO15:READM(A,
B):NEXT:NEXT
28 T=200:SC=0:Z=0:A=7:B=5:POKE13
310,51:X=2:D(0)=8:D(1)=1:D(2)=2:
D(3)=4:D(4)=8:S(1)=1:S(4)=-1:T(2
)=-1:T(8)=1:H=13311:I=13308:J=13
309:K=13280:L=154:M=168:N=182:O=
196:S1=2:O1=500
30 X(0)=0:X(1)=0:X(2)=15:Y(0)=4:
Y(1)=8:Y(2)=8:P=100:Q=10:R=14:S=
59:V=.03:U=54:F=32:G=2
32 Z1=0:GOSUB72:GOSUB142
34 IFT THENT=T-1:POKEI,U:POKEJ,5
0:POKEH,INT(T/P)*R+R:EXECK:POKEJ
,52:POKEH,INT((T-INT(T/P)*P)/Q)*
R+R:EXECK:POKEJ,U:POKEH,INT(T-IN
T(T/Q)*Q)*R+R:EXECK:ELSE82
36 IFZ1=0THENZ1=1:P1=(RND(G)-1)*
7:ELSEIFZ1=2THEN40
38 POKEH,RND(Q)*R:POKEI,55:POKEJ
,40+P1*G:EXECK:IFB=.ANDA=4+P1 TH
ENZ1=G:SC=SC+50:GOSUB72:FORC=89T
0239STEP10:SOUNDC,1:NEXT
40 POKEI,55+B:POKEJ,F+G*A:POKEH,
L:EXECK:C=SGN(INT(JOYSTK(.)/S-V)
):IFC THENE=2.5-C*1.5:IFM(A,B)AN
DE THENA=A+C:GOTO44ELSE44
42 D=SGN(INT(JOYSTK(1)/S-V)):E=5
+D*3:IFM(A,B)ANDE THENB=B+D
44 POKEI,55+B:POKEJ,F+G*A:POKEH,
M:EXECK:IFPEEK(65280)AND1ORZ OR(
S1=0)THEN48
46 SOUND239,1:SOUND176,1:S1=S1-1
:POKEH,L:POKEI,53:POKEJ,U+G*S1:E
XECK:IFE ANDM(A,B)THEND1=E:X1=A+
S(E):Y1=B+T(E):Z=1:POKEI,55+Y1:P
OKEJ,F+G*X1:POKEH,O:EXECK:ELSE82
48 IFZ1=2ANDB=0ANDA=11-P1 THENSC
=SC+P+T:T=200:GOSUB72:Z1=0:FORC=
239TO89STEP-10:SOUNDC,1:NEXT:X=X
+1:X(X)=(RND(G)-1)*15:Y(X)=4+(RN
D(G)-1)*4
50 IFX<0THEN64ELSEIFZ THENFORW=0
TOX:IFX1=X(W)ANDY1=Y(W)THENX=X-1
:FORC=W TOX:X(C)=X(C+1):Y(C)=Y(C
+1):NEXT:SOUND200,1:SOUND200,1:S
OUND200,1:Z=0:SC=SC+20:POKEI,55+
Y1:POKEJ,F+G*X1:POKEH,L:EXECK:GO
SUB72:GOTO50ELSENEXT
52 FORW=0TOX:POKEI,55+Y(W):POKEJ
,F+G*X(W):POKEH,L:EXECK:IFA=X(W)
ANDB=Y(W)THEN82
54 ONRND(3)GOTO56,58,60
56 D=D(RND(4)):IFM(X(W),Y(W))AND
D THENX(W)=X(W)+S(D):Y(W)=Y(W)+T
(D):GOTO62ELSE62
58 D=D(SGN(X(W)-A)+G):IFM(X(W),Y
(W))ANDD THENX(W)=X(W)+S(D):Y(W)
=Y(W)+T(D):GOTO62ELSE62
60 D=D(SGN(Y(W)-B)+1):IFM(X(W),Y
(W))ANDD THENX(W)=X(W)+S(D):Y(W)
=Y(W)+T(D)
62 IFA=X(W)ANDB=Y(W)THEN82ELSEPO
KEI,55+Y(W):POKEJ,F+G*X(W):POKEH
,N:EXECK:NEXT
64 IFZ=0THEN34
66 IFA=X1 ANDB=Y1 THEN82ELSEPOKE
I,55+Y1:POKEJ,F+G*X1:POKEH,L:EXE
CK:IFX>-1THENFORW=0TOX:IFX1=X(W)
ANDY1=Y(W)THENX=X-1:FORC=W TOX:X
(C)=X(C+1):Y(C)=Y(C+1):NEXT:SOUN
D200,1:SOUND200,1:SOUND200,1:Z=0
:SC=SC+20:EXECK:GOSUB72:GOTO34EL
SENEXT
68 IFD1 ANDM(X1,Y1)THENX1=X1+S(D
1):Y1=Y1+T(D1):ELSED1=D(RND(4))
70 IFA=X1 ANDB=Y1 THEN82ELSEPOKE
I,55+Y1:POKEJ,F+G*X1:POKEH,O:EXE
CK:GOTO34
72 POKEI,53:D=10000:IFSC>99999TH
ENSC=SC-99999
74 E=SC:FORC=44TO52STEP2:POKEJ,C
:POKEH,INT(E/D)*R+R:EXECK:E=E-IN
T(E/D)*D:D=D/Q:NEXT:IFSC>O1 THEN
O1=O1+500:IFS1<5 THENS1=S1+1
76 POKEH,O:C=U:E=S1
78 IFE=0THENRETURN:ELSEPOKEJ,C:E
XECK:E=E-1:C=C+G:GOTO78
80 RETURN
82 FORC=1TO3:SOUND218,1:SOUND221
,1:NEXT:FORC=1TO3:SOUND176,1:SOU
ND180,1:NEXT:FORC=1TO3:SOUND89,1
:SOUND99,1:NEXT:SOUND89,2:SOUND1
17,2:SOUND147,2:SOUND153,10:SOUN
D140,2:SOUND147,2:SOUND176,2
84 CLS:PRINT@160,"SCORE:"SC:IFSC
>HS THENHS=SC
86 PRINT:PRINT"HIGH SCORE:"HS:PR
INT@448,"PLAY AGAIN?"
88 POKEH,L:FORA=8TO22STEP2:POKEJ
,32+A:FORB=0TO3:POKEI,55+B:EXECK
:NEXT:NEXT:FORA=0TO30STEP2:POKEJ
,F+A:FORB=4TO8:POKEI,55+B:EXECK:
NEXT:NEXT:GOSUB144:A$=INKEY$
90 A$=INKEY$:IFA$=""THEN90ELSEIF
A$="Y"THEN28ELSEIFA$<>"N"THEN90E
LSECLS:CLEAR200,32767:POKE65494,
0:END
92 DATA,,,,,,,,,,,,,17,16,85,84
,21,80,85,84,21,80,85,84,17,16,1
28,,160,,42,,10,128,2,160,
94 DATA40,,8,,,,192,12,204,3,240
,12,204,,192,,
96 DATA142,52,,204,,,237,129,140
,64,,38,249,57,190,51,254,16
98 DATA142,,7,254,51,252,230,65,
196,3,166,128,234,128,237,196,51
,200,32,49,63,38,239,57
100 DATA0,0,3,192,48,12,51,204,2
43,207,252,63,255,255
102 DATA117648,117648,117648,624
25,117355,117362,62245,117363
104 DATA62244,62140,117469,62142
,61903,61799,61903,61799
106 DATA60188,117365,115411,6179
9,61903,61799,117126,61799
108 DATA61903,62142,117469,62140
,62244,62154,117307,62153
110 DATA62132,62425,117648,11764
8,117648
112 DATA240,136,96,152,128,168,9
6,168,159,96,46,169,20,107,172,6
5,62,128
114 DATA340,65,65,65,65,65,340,1
6,68,257,257,341,257,257,341,16,
16,16,16,16,16,16,68,257,257,341
,257,257,,,,,,,,341,16,16,16,16,
16,16
116 DATA340,257,257,340,272,260,
257,16,68,257,257,341,257,257,25
7,257,321,273,261,257,257,84,257
,256,84,1,257,84
118 DATA341,256,256,336,256,256,
256,341,256,256,336,256,256,341,
340,257,257,340,272,260,257
120 DATA84,257,256,84,1,257,84,8
4,257,256,256,256,257,84,84,257,
257,257,257,257,84
122 DATA340,257,257,340,272,260,
257,341,256,256,336,256,256,341,
,80,80,,80,80,
124 DATA341,16,16,16,16,16,16,84
,16,16,16,16,16,84,257,325,273,2
73,257,257,257,341,256,256,336,2
56,256,341,,80,80,,80,80,
126 DATA0,1,4,5,16,20,64,68,80,8
4
128 DATA18,22,25,27,32,22,18,6,1
6,6,6,6,18,18,22,2,18,20,20,39
,18,22,2,8,2,22,18,4,8,14,24,39,
4,4
130 DATA39,20,38,2,2,22,18,8,10,
20,38,22,22,18,39,2,4,6,10,20,20
,18,22,22,18,22,22,18,18,22,22,1
8,2,4,16
132 DATA,,,,9,5,5,12,9,5,5,12,,,
,,,,,,10,9,13,6,3,13,12,10,,,,
134 DATA,,,,11,6,3,12,9,6,3,14,,
,,,,,,3,12,9,6,3,12,9,6,,,,
136 DATA9,5,5,5,13,6,10,9,12,10,
3,13,5,5,5,12,10,9,5,12,3,12,11,
14,11,14,9,6,9,5,12,10
138 DATA10,10,1,6,9,6,10,3,6,10,
3,12,3,4,10,10,10,3,5,5,7,5,14,9
,12,11,5,7,5,5,6,10
140 DATA3,5,5,5,5,5,7,6,3,7,5,5,
5,5,5,6
142 POKE65485,0:POKE65487,0:POKE
65477,0:POKE65314,(PEEK(65314)AN
D7)OR248:RETURN
144 POKE65484,0:POKE65486,0:POKE
65476,0:POKE65314,(PEEK(65314)AN
D7):RETURN
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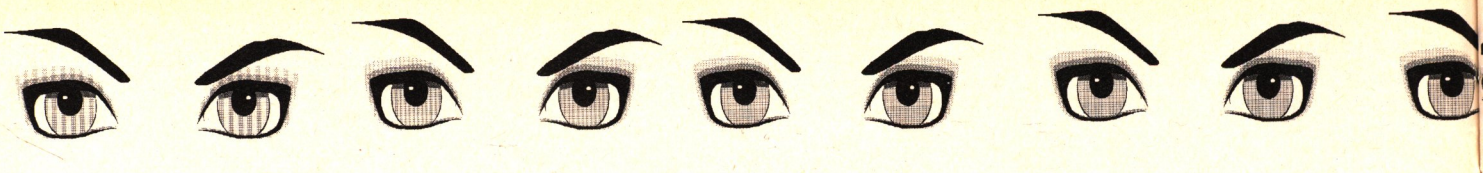
One of the MM/1's lower resolution modes -- 320 x 400. The MM/1 handles up to 720 x 560 pixels on screen.



Logon protection for the single-user OS-9 system

For Your Eyes Only

by Stephen B. Goldberg

Many users protect their OS-9 disks from unauthorized use by using the `tsmon` utility in the `startup` file. This utility provides password protection in conjunction with the `login` command. The price you pay for `tsmon` is a RAM overhead of almost 2K; 2K is devoted to a routine that just sits there and waits for a new user to log in. And most Color Computer OS-9 systems are not set up for multiple users.

Log provides the same protection as `tsmon` with no RAM loss. It can also free disk space, plus you can delete `tsmon` and `login` from your `CMDS` directory, and `password` and `motd` from your `SYS` directory.

Use `edit` to enter the source code. At the label `usr`, replace the underscores with your own login name, and in the next line (`pwd`) replace the underscores with your password. You may use the welcome message provided at the end of the program, or supply your own message.

Assemble `log` (`asm log o #10K`), then delete your `startup` file. Build a new `startup` that contains the line `log </term`.

When you boot OS-9, `log` executes and disables the keyboard abort, interrupt and escape functions so that the login procedure cannot be bypassed. The `setime` utility is executed and a rough check of the date is made. If you enter a month greater than 12 or a day greater than 31, or if you do not set the date, you are reprompted until a reasonable entry is made.

Next, you have three chances to enter your correct name and password. (The screen does not display your password entry so that, even if watched, it remains your secret.) If in three attempts you cannot make the correct entries, you are notified of your failure. To try again, press ENTER.

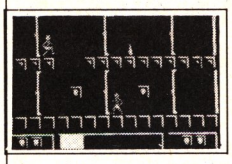
When you have replied correctly to the name and password prompts, the interrupt, abort and escape functions are enabled again, your message is printed on the screen and `log` unlinks itself. You end up in the shell with all available RAM at your disposal. ❑

Steve Goldberg is a dentist who enjoys programming on his son's CoCo. He may be contacted at 695 Plainview Road, Bethpage, NY 11714. Please include an SASE when requesting a reply.

The Listing: `log.asm`

```
*******************************************************
*
* LOG - COPYRIGHT (c) 1985 by S. B. GOLDBERG
*
* Login utility for single user OS-9
*
* Enter:
*       use   /d0/defs/os9defs
*       use   /d0/defs/scfdefs
* between ifp1 and endc
*
        ifp1
        nam   log
        ttl   Login utility for single user OS-9
        use   /d0/defs/scfdefs
        use   /d0/defs/os9defs
        endc
*
        mod   len,name,prgrm+objct,reent+1,entry,dsiz
*
sta     rmb   32   status options
count   rmb   1   count tries
buffer  rmb   50   line buffer
        rmb   200   stack
dsiz    equ   .
name    fcs   /log/
        fcc   /COPYRIGHT (c) 1985 by S. B. GOLDBERG/
*****************************
*
*
* LOGIN NAME AND PASSWORD
*
```


IT'S SUPER SALE TIME AGAIN!!

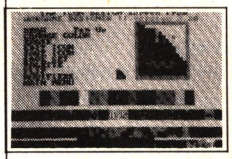


BARBARIAN QUEST

Save your bride to be from the horrors of the evil Luthor's domain! Screen after screen of beautiful graphics and exciting arcade action with fully animated characters. Great digitized sound. Walk, run, jump, climb and fight cohorts. Game includes an optional continue feature that allows you to keep playing even if you loose! Set your own level of stress! It's great arcade action! Requires 512K and 1 disk drive. ~~$34~~ ON SALE!!!! JUST $29
Reviewed July '90

THE SUPER DISK

Never before have so many powerful disk utilities been assembled in one package. The manual contains NEVER BEFORE PUBLISHED information about copy protection techniques and the disk has ALL of the utilities you need to use that information. If you are an author, this is a MUST HAVE package! If you just like to SNOOP, this disk has everything you need to read & write any part of a disk, even the data you were not meant to see! If you want to create copy protected disks or copy your valuable originals, THE SUPER DISK is for you! ~~$39~~ ON SALE!!!! ONLY $29
Reviewed March '90



WARGAME DESIGNER II

WGD II is a complete graphic oriented war game design system. Create your own graphic icons for units and terrain features. Design your own maps. Assign each unit it's own unique attributes. Then play the games you want to , the ones YOU designed. It's easy. All modules are menu driven, no programing knowledge required. Comes complete with manual, 2 floppy disks and 4 ready to play scenarios. ~~$29~~ ON SALE!!!! JUST $24
Reviews August '88, July '89, September '89

WARGAME DESIGNER ICON DISK

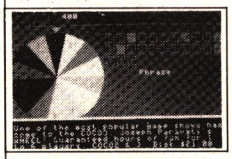
This disk contains hundreds of ready to use icons for units and terrain features. Save hours of design time. Just transfer these icons to your WGD II game disk (automatically from menu) and you're ready to design a new scenario. A real bargain at just $15
Reviewed June '89

WEEKLY WINNER 3.0

Recently updated, WW 3.0 now handles 3,4,5,6 and 7 digit lottos. We've personally seen it pick 4 and 5 out of 6 in the Ohio SUPER LOTTO and have had reports of winnings from users in other parts of the US. Enhance YOUR chance! Invest in WEEKLY WINNER 3 today ONLY $15

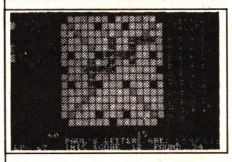
COCO 3 FLAGS

This is the BEST "RISK" play alike available for the COCO 3. Screen shows the entire world and zooms in on the area you choose. For 1 to 6 players. It's great entertainment for a mere ~~$21~~. ON SALE!!!! ONLY $19
Reviewed August '89



COCO 3 WHEEL

Outstanding party fun of 1 to 6 players! You can even design your own word puzzles. ~~$21~~ ON SALE!!!! JUST $19.
Reviewed May '89



VOCAB

If you like SCRABBLE, you'll love VOCAB. It even includes a family of computer opponents. For 1 to 6 players. ~~$21~~ ON SALE!!!! JUST $19
Reviewed March '90

NEW!!! **GNOME** **NEW!!!**

Great addictive non-violent arcade action fun by Mike Snyder. See if you as Tel Hilar, the Gnome Prince can recover the Spirit Sword from the evil Jarane. Dozens of screens to conquer require quick reflexes and concentration. ML, COCO 3 128K Disk. INTRODUCTORY PRICE JUST $21.

NEW!! **FIRESPIRE** **NEW!!!**

Here comes the sequel to GNOME already! We should have waited but this is just too much fun to hold back! Now that you've recovered the Spirit Sword, it's time to find the Firespire. More screens, more action than GNOME. GNOME not required to play. ML, COCO 3, Disk. ALSO INTRODUCTORY PRICED AT $21.

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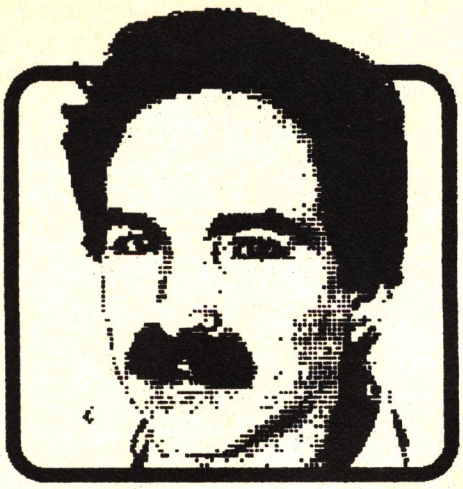
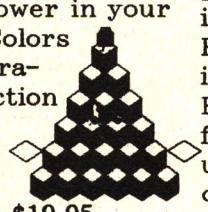
```
*
usr     fcs   /_________/  enter your own name
pwd     fcs   /_________/  enter your own password
*******************************
*
*
* DISABLE QUIT, ABORT AND ESCAPE
*
*
entry   lbsr  getsta   get terminal option package
        std   pd.int   disable abort and quit
        clr   pd.eof   disable escape (eof)
        os9   i$setstt   set new status
*******************************
*
*
* SET CLOCK
*
*
getime  leax  time,pcr   name of SETIME utility
        ldy   #0
        lda   #prgrm+objct
        ldb   #3
        os9   f$fork   execute SETIME
        lbcs  error   branch on error
        os9   f$wait   wait for SETIME exit
        bcs   error   branch on error
*******************************
*
*
* CHECK DATE
*
*
        leax  sta,u   time package buffer
        os9   f$time   get time package
        ldd   1,x   month and day
        cmpa  #12   month >12?
        bhi   getime   yes, reset clock
        cmpa  #1   <1?
        blo   getime   yes, reset
        cmpb  #31   day >31?
        bhi   getime   yes, reset
        cmpb  #1   <1?
        blo   getime   yes, reset
*******************************
*
*
* INITIALIZE
*
*
enter   ldb   #3   three tries
        stb   count   save it
        leax  spce,pcr   line feeds
        bsr   print   put on screen
*******************************
*
*
* GET NAME AND PASSWORD
*
*
agn     leax  nm,pcr   user name prompt
        ldy   #11   length of prompt
        bsr   print1   put on screen
        bsr   get   get input of name
        leay  usr,pcr   address of user name
        os9   f$cmpnam   compare with input
        bcs   nonam   branch if not same
        leax  pass,pcr   password prompt
        ldy   #10   length of prompt
        bsr   print1   put on screen
        bsr   getsta   get terminal option package
        clr   pd.eko   disable screen echo
        os9   i$setstt   set new status
        bcs   error   branch on error
        bsr   get   get input of password
        pshs  b   save length
        bsr   getsta   get terminal option package
        inc   pd.eko   enable screen echo
        os9   i$setstt   set new status
        bcs   error   branch on error
        puls  b   get password input length
        leay  pwd,pcr   address of password
        leax  buffer,u   address of input
        os9   f$cmpnam   compare input with password
        bcs   nopas   branch if not same
        bsr   getsta   get terminal option package
        ldy   #$0305
        sty   pd.int   enable abort and quit
        lda   #27
        sta   pd.eof   enable escape (eof)
        clra
        os9   i$setstt   set new status
        bcs   error   branch on error
        leax  message,pcr  address of login message
        bsr   print   put message on screen
        clrb   clear error flag
error   os9   f$exit   end of login
*******************************
*
*
* GET STATUS OPTION PACKAGE
*
*
getsta  leax  sta,u   status package address
        ldd   #0   path and option
        os9   i$getstt   get option package
        bcs   error   branch on error
        rts   return
*******************************
*
*
* SCREEN PRINT
*
*
print   ldy   #2000   maximum length (full screen)
print1  lda   #1   standard output path
        os9   i$writln   write to screen
        bcs   error   branch on error
        rts   return
*******************************
*
*
* GET KEYBOARD INPUT
*
*
get     clra   standard input path
        ldy   #50   maximum length
        leax  buffer,u   input buffer address
        os9   i$readln   get input line
        bcs   error   branch on error
        tfr   y,d   transfer input length
        decb   discount carriage return
        rts   return
*******************************
*
*
* ERROR MSG. IF NO MATCH
*
*
nonam   leax  badnam,pcr   bad name prompt
        bra   show   put on screen
nopas   leax  badpas,pcr   bad passwd prompt
show    bsr   print   put on screen
        dec   count   count incorrect entry
        lbne  agn   not 3?  Try again
*******************************
*
*
* FAILURE MESSAGE
*
*
sorry   leax  fail,pcr   address of fail display
        bsr   print   put on screen
        bsr   get   wait for input
        lbra  enter   start over
*
nm      fcc   /User name: /
pass    fcc   /Password: /
badnam  fcc   /Who?/
spce    fdb   $0a0d
badpas  fcc   /Invalid password./
        fdb   $0a0d
fail    fcc   /It's been nice communicating with you./
        fcb   $0a
        fcc   /Better luck next time./
        fcb   $0d
message fcb   $0a
*
* You can use any message you want in place of welcome.
*
        fcc   /WELCOME TO COLOR COMPUTER OS-9./
        fcb   $0d
time    fcc   /setime/
        fcb   $0d
        emod
len     equ   *
```

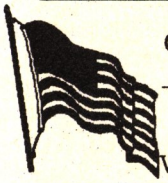


Pyramix

This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. **Disk: $19.95**



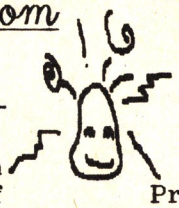
The Freedom Series



Vocal Freedom

Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom **Disk: $34.95.** Optional Hacker's Pac **Disk: $19.95. Disk for both: $49.95**

Mental Freedom



Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? You control the action with your thoughts and emotions. Your goal is to materialize and levitate objects with the power of your mind while avoiding the insidious cobra. Mental Freedom teaches peace of mind in the face of adversity. Mental Freedom even talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675. Will run on a CoCo 2 or 3 but not CoCo 1. **Disk: $24.95**

Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our Printer Lightning. **Disk: $19.95**

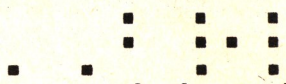
Printer Lightning

Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard! **Disk: $19.95**

Backup Lightning

Reads your master disk once and then makes super fast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives. This utility requires 512K. **Disk: $19.95**

COCO Braille



Produce standard grade 2 Braille on a Brother daisy wheel printer. Easy to use for sighted or blind user. No knowledge of Braille is necessary. Call for free sample. Will run on CoCo 1, 2, or 3. **Disk: $69.95**

VDOS the UnDisk

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only. Available only on **tape: $24.95**

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Using reports to view your warehouse of bills, checks and deposits

Do-It-Yourself Database, Part V

by Richard Perlman

The database we've built holds all of your bills, checks and deposits for the entire year. You will probably not want to see all of them at once, but only those checks written after a certain date, which have cleared your account, or all checks and deposits for one specified month. The RETRV program lets you do this with a minimum of fuss and bother. You describe the records you want to see by supplying a range of values for any or all of the data fields in the record. The program tests each record in the database to determine whether its information is within this range. If it is, that record appears on the report. If not, the record is excluded from the report. But you can't be lazy. If you don't supply a range, the program does not test that data field or exclude records based on the information in that data field. If you don't supply any ranges at all (which is allowed), the program assumes you want to see all of the records in the file.

Making Choices

Your first choice is shown on Menu A. You may choose to list Checks, Deposits or Bills, or one of two combined listings. The combined listings include Checks and Bills or Checks and Deposits. To get the ranges, the program sends you to Menu Z, which identifies each data field with a number and lets you use that number to select the data field for which you want to supply a range. When you enter a number from 1 to 6, the program requests that you enter both the high and low values for that range. After you supply these values, the program places an asterisk (*) on the screen next to the item number and allows you to choose another item. You can provide ranges for any, all or none of the items numbered 1 to 6. You can also respecify the high and low range values for the same item. The program stores the ranges for later use and sets a Range Value indicator to 1. You can also choose Option 7, which calculates totals and prints them at the end of the report. Choose Option 8 when you are finished supplying range values to start the report.

Speed

Choosing Option 8 begins the report. The first time I did this it took a long time to finish the report, because the program had to open and close each of the 24 files on the database, read each record, examine each data field on each record to see if it was to be included or excluded, and switch to the next file when end-of-file was detected on the current file. If you find the wait long, you can speed things up by reducing the number of tests on each record and reducing the total number of data files processed.

You can reduce the number of tests per record by using the Range Value indicators to control the testing. These Range Value indicators are in Array RV. Each element in the array corresponds to one data field. If the indicator is set to 1, ranges are set and the data field in each record must be tested against the ranges. If it is zero, no range is entered and no tests are made. The program doesn't waste time with tests not included and therefore runs faster.

To limit the number of files processed, skip as many of them as possible and stop reading them when possible. Also stop the search at any time by pressing the space bar.

Supplying a range of dates activates the Skip-and-Stop. As mentioned earlier, the database records are filed in date sequence. There are a total of 24 files, and each contains records with a specific range of dates (1/2 month). The program calculates which file corresponds to any date, so if you supply a starting date of April 1 and ending date of August 15, the program begins its search by opening the April file and proceeding from there. The lines below accomplish this:

```
1790 RC=0:ON RV(2) GOTO 1820
1800 SG$="M01D01/CHK":GOTO 1860
1820 IF LD$ > "15" THEN DD$ = "1
5" ELSE DD$ = "01"
1840 MM$=LM$:SG$ = "M"+MM$+"D"+D
D$+"/CHK"
1860 OPEN "I",#1,SG$
```

The name of the first opened database file is placed in the variable SG$. Line 1860 opens this file. If a date range is entered, RV(2) is set to 1, LD$ is set to the lowest day in the range, and LM$ is set to the lowest month. Line 1790 directs control to Line 1820 if RV(2) is set to 1 and to Line 1800 if it isn't. Lines 1820 and 1840 construct the correct filename. Control passes to the search subroutine, which ends the search when the first record with a date higher than August

---

Richard Perlman spends his time at work helping others use their PCs. At home, he shares his CoCo 2 with his wife and two children. He may be contacted at 83-84 169 Street, Jamaica, NY 11431.

15 is found.

Even if you don't supply a date range, you may decide you've seen enough and want to stop the report. Do this by pressing the space bar. The program checks to see if the space bar is pressed before it reads each record. Because the program may not be reading a record when you press the space bar, hold it down. The program eventually checks it and stops the report. If you ask for totals, the program calculates and prints those records already displayed.

Record Search and Selection

The subroutine begins at Line 10280 and ends at Line 11240. It requires you to place values in specific variables before you call it. Variable SG$ must contain the name of the database file, and each element in the RV array must have a value. The Range Value code places a value of 1 in RV(1) through RV(6) when you specify ranges for the corresponding data field. Otherwise RV(*n*) is zero. These fields are as follows: RV(1) for Check, Bill or Deposit number; RV(2) for Date; RV(3) for Cleared; RV(4) for Amount; RV(5) for Paid To; and RV(6) for Purpose. The select subroutine consists mostly of ON GOSUB statements. See lines 10340 through 10460. If RV(*n*) is set to 1, the ON GOSUB statement calls the associated checking subroutine.

The INPUT statement reads each database record in Line 10300. Remember, the program stops running if you attempt to read past end-of-file. So check to see if this condition is present before processing the INPUT statement. Line 10282 prevents you from reading past the end of a data file. Since your database contains 24 files, reaching end-of-file does not mean you have reached the end-of-database. The database filename is contained in the variable SG$. The last file in the database is M12D15/CHK. If that is the name in SG$, you have reached end-of-database. Depending upon this test and other tests the subroutine performs, values are placed in the indicator fields RJ and RI. Figure 1 shows the possible values found when all tests are complete.

If any range test other than the date-higher test fails, the program adds 1 to RJ. (RJ is also a Return Indicator.) When all range tests are complete, Line 10520 tests RJ. If it contains any value greater than zero, the record is excluded as the program goes back to Line 10280 to read another record. If the program passes all tests, RI is set to 1 and the subroutine returns to the program. The program then uses an ON GOTO statement to test the value in RI. If it finds a 1, it processes the record. If it finds a 2, it must end the report, printing whatever totals are required, and return to the previous menu.

Scrolling the Screen

When you repeatedly use the PRINT statement to display lines on the screen, each line prints below the previous one. When you get to the last line on the screen, the CoCo scrolls (moves) the entire display

Condition	RJ	RI
Record passed all tests and can be included in the report	0	1
Record failed some of all of the tests	1-7	0
No more records. You are past the end of the last data file in the database, or have read a record with a date higher than the the highest date specified in the date range	0	2
Operator pressed the space bar while the report was printing	0	2

End-of-database condition described above causes the program to place a 2 in the RI (Return Indicator) variable. Subroutine returns control to the program with either a 1 or a 2 in this variable.

The "if the space bar was pressed then end the report" test is made immediately before the record is read (Line 10280).

The "read a record with a higher date than was in the allowable range" test is seen in Line 10380. If a date range was specified then RV(2) was set to 1 and the Line 10660 will place 2 in RI if the date was found to be higher.

Figure 1: Return Indicator Condition Codes

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```
CHECK AND DEPOSIT REPORT

DATE    NMBR    CD        DEPO-AMT     CHCK-AMT
1010    1234                             123.45
1011    1235                              56.90
1012    0100    *           200.10
1013    1238    *                        1000.24
1020    0101                500.10
SUBTOTALS                   700.20       1180.59
OP BAL/TOTALS   500.00       19.61
```

Figure 2: Checks and Deposits Report

up by one line and prints the next line at the bottom. The top line on the screen gets lost in this process. Even if you have very quick eyes, you cannot keep up with the scrolling. To solve this problem, pause printing after the last line prints. The program keeps track of the line numbers on the screen by using the variable PL. When PL=14, the program goes into a wait state. After you press any key, the screen clears and the display begins again at the top of the screen.

Producing a Statement

A Statement Report is a listing of Checks and Deposits over a period of time. Use the Statement Report to verify the accuracy of your bank statement, to provide your own statement before the end of the month, to include checks and deposits not yet cleared on your account, or to produce a quarterly (or other non-monthly time period) report.

Before you run the Statement Report, know whether you want to include an opening balance, totals, all activity or only that cleared by the account, and the time period you want to use; then type RUN"RETRV". From Menu A choose Option 4, Special Reporting. This takes you to Menu X from which you choose Option 1, Checks and Deposits Statement. Next you see Menu Y (the Opening balance Menu). Here you can enter and re-enter a balance. When you are ready to continue, choose Option 2, Enter Record Selection Ranges. Next you see Menu R. On this screen you might choose Option 2, By Date; then Option 7, Print Totals; then Option 8, Continue. A sample report is shown in Figure 2.

This report covers the period of time from October 10 through October 20. During this time three checks were written and two deposits were made. One check and one deposit have not yet cleared the account. There is an opening balance of $500. When the outstanding check and deposit clear the account, the closing balance is $19.61.

Balance Report

A Balance Report is a listing of checks and bills over a period of time. Before you run the Balance Report, know whether you want to limit the report to a specific person or company, whether you want subtotals and totals, whether you want to see all activity or only that which has cleared the account, and the time period you want to use. To run this report, enter RUN"RETRV". From Menu A choose Option 4, Special Reporting. When you see Menu X, choose Option 2, Checks and Bills Balance. When you see Menu R, choose Option 2, By Date; then Option 5, By Paid To Or From; then Option 7, Print Totals; then Option 8, Continue. Figure 3 shows a sample report.

This report covers the period of time from January 10 through March 10. To/From is entered as Telephone. In this time three bills were received and two checks were written. All items have cleared the account. There is an outstanding amount owed of $99.44.

```
CHECK/BILL  REPORT

Date    Number      TC    Description     Amount
0110    0010        B     TELEPHONE       123.45
0120    1235        C     TELEPHONE      -123.45
0210    0034        B     TELEPHONE        57.80
0220    1238        C     TELEPHONE       -57.80
0310    0059        B     TELEPHONE        99.44
BILL TOTAL                                290.69
CHECK TOTAL                              -181.25
OUTSTANDING AMOUNT                         99.44
```

Figure 3: Balance Report

Your Own Reporting

It is not difficult to create your own reports. You can create other screen formats (some folks like to have today's date somewhere on the screen), print your report, (with a longer line you can display more information), or write it to a data file for editing or inclusion into some other program. It is easy to fit the code into RETRV, especially if you use the existing subroutines to help you. You should start with the Special Reporting Menu X, Line 3000.

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32K Disk

```
320 ..... 89
442 ..... 45
500 ..... 128
640 ..... 111
755 ..... 0
880 ..... 164
940 ..... 176
1030 ..... 92
1110 ..... 207
1180 ..... 213
1320 ..... 42
1460 ..... 253
1620 ..... 99
1790 ..... 23
1868 ..... 223
1950 ..... 161
1996 ..... 221
3000 ..... 191
3014 ..... 215
3080 ..... 49
3150 ..... 182
3240 ..... 46
3270 ..... 59
4105 ..... 186
4175 ..... 13
4255 ..... 243
4280 ..... 206
9100 ..... 165
9240 ..... 72
9420 ..... 185
9860 ..... 83
10000 ..... 187
10160 ..... 178
10280 ..... 241
10318 ..... 66
10432 ..... 224
10510 ..... 6
10580 ..... 162
10700 ..... 167
END ..... 72
```

The Listing: RETRV

```
0 'COPYRIGHT 1990, FALSOFT INC
100 CLEAR 650
120 DIM LI$(8)
140 DIM RV(8)
160 CLS0:PRINT @0,"— DATA BA
SE RETRIEVAL——a
180 LI$(1)="1. CHECK LISTING
200 LI$(2)="2. DEPOSIT LISTING
220 LI$(3)="3. BILL LISTING
240 LI$(4)="4. SPECIAL REPORTING
260 LI$(5)="5. RUN THE DATABASE
UPDATE
280 LI$(6)="6. END THIS SESSION
300 SL=96:NL=6:RC=0:GOSUB 9020
320 ON A GOTO 460,444,442,3000,4
40,340
340 PRINT @416,"** SESSION OVER
- TOUCH ANY KEY"
360 FOR I= 1 TO 150:AA$= INKEY$:
IF AA$ <> "" GOTO 420
380 NEXT I:PRINT @416,STRING$(31
," ")
400 FOR I= 1 TO 60:AA$= INKEY$:I
F AA$ <> "" GOTO 420 ELSE NEXT I
:GOTO 340
420 CLS:END
440 RUN "DATAB"
442 RT$="BILL":RV(8)=2:RX$="B":G
OTO 470
444 RT$="DEPOSIT":RV(8)=3:RX$="D
":GOTO 470
460 RT$="CHECK":RV(8)=1:RX$="C"
470 AD=1:LI$(1)="1. FIND A SPECI
FIC "+RT$
480 LI$(2)="2. FIND A RANGE OF "
+RT$+"S":LI$(3)="3. RETURN TO TH
E MAIN MENU
490 LI$(4)="4. RUN THE DATABASE
UPDATE":LI$(5)="5. END THIS SESS
ION
500 CLS:PRINT @25,"——b":PRIN
T @0," - FIND (SOME) ";RT$;"S
";
520 SL=96:NL=5:GOSUB 9020
540 ON A GOTO 560,1035,160,440,3
40
560 CLS:PRINT @25,"——c":PRIN
T @0,"- SEARCH FOR A ";RT$;" ";
580 SL=64:VT$="N":LV=1000:HV=999
9:P$="ENTER "+RT$+" NUMBER"
600 GOSUB 9220:SN$=VA$
620 SL=128:VT$="N":HV=12:LV=1
640 P$="ENTER MONTH OF "+RT$+":
1-12":GOSUB 9220:MM$=RIGHT$("0"+
VA$,2)
```

This section of code is ideally placed for you to add reports of your own. You can run your report from Menu X by doing the following:

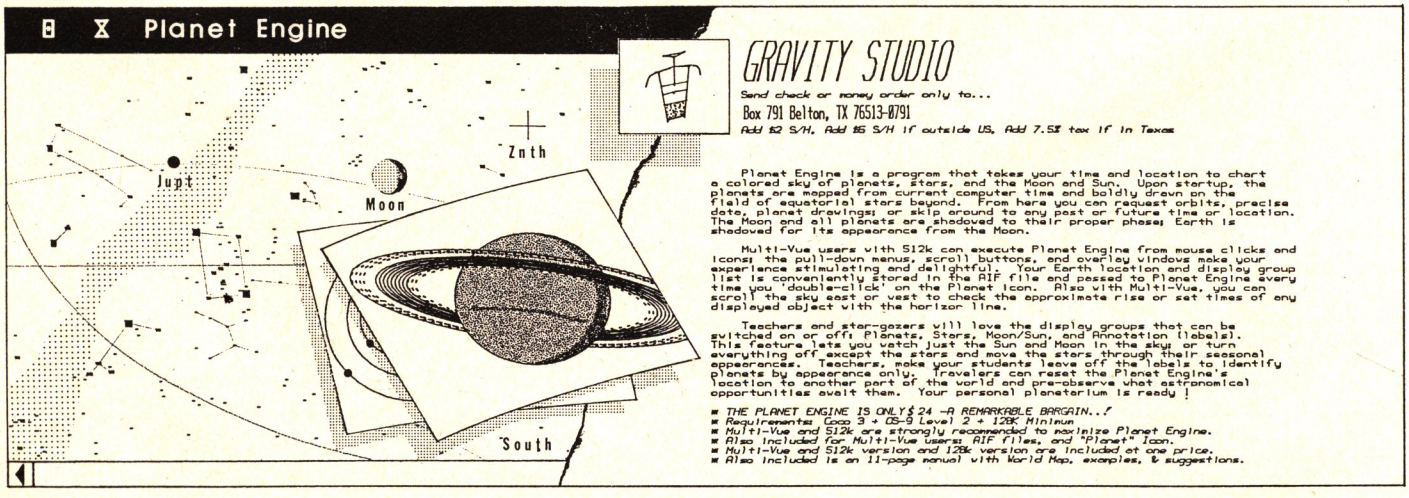
- add the report title as an element in the LI$ array between lines 3005 and 3014.
- change Line 3016 from NL=5 to the number of lines you want on the menu.
- change Line 3018 so the program can transfer control to the line number of your report code when the proper number is entered.
- begin your report code in an available range of sequence numbers (5000 through 8000 are available).
- end your code with a GOTO 3000.

Look at the existing reports to pick up some ideas. The first report (Checks and Deposits) begins at Line 3020 and ends at 3920. The second report (Checks and Bills) begins at 4000 and ends at 4920. Lines in the 3900 and 4900 range are reserved for the action when the screen fills up.

There are several subroutines to use. To get data field ranges, GOTO 1040. It is important to see lines 1862 and 1863 as examples for how to get back to your original location. Make sure you clear all the necessary RV(*x*) elements to zero before you get to Line 1040. To use the end-of-screen logic, follow the coding scheme used in the 3900 and 4900 range. See how the program uses them at the beginning of and during the report. To use the record selection subroutine, use GOSUB 10280 and test the value in RI to see what action should be taken when it returns to your code.

A Database on Cassette?

You can do this, but there are some limitations to consider such as memory size, database size and the method of update. For articles about a database on cassette, please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* Also included is an 11-page manual with World Map, examples, & suggestions.

write me. Include details about your CoCo and the information you need.

The biggest difference between using cassette and disk is that only one file on the cassette is processed at a time. To update a cassette file, read the entire file into an array in the memory of the computer (maintaining the identity of each record), perform the update, and write the entire array out to another cassette file. Both the update program and the database file must fit into the memory of the computer at the same time. Concerning chaining, even if the computer has 32K or 64K, you don't have nearly this amount of space to use for programs. You must devise a method to split your database so it can be stored on more than one cassette. If your database is small, you can use one cassette file. To find out how much memory you have left after a program is loaded, load the program (without running it) and type `PRINT MEM`. Also use the `CLEAR` *nnnn* command to reserve enough space for the array. If you do not do this, an OB Error occurs.

It is not difficult to create your own reports. You can create other screen formats, print your report, or write it to a data file for editing or inclusion into some other program.

Many techniques will help you. Your Data Dictionary and the method you use to determine how much data (and which data) is stored on each cassette determines what you can do. You'll need 64K of memory.

Modifying the Database

Using the principles illustrated in this series, you can modify this database for other uses. This is really handy. You can have the system you want and know how it

```
660 SL=192:P$="NEXT ENTER THE DA
Y: 1-31"
680 VT$="N":LV=1:HV=31:GOSUB 922
0
700 DD$=RIGHT$("0"+VA$,2):GOSUB
9800
720 MK$=MM$+DD$+RX$+SN$:GOSUB 99
00:IF GE=2 GOTO 1022
740 CLS0
750 HF$="<<<<<<<<< CHECK FOUND >
>>>>>>>>>"
755 IF RX$ = "B" THEN MID$(HF$,9
,7) = "<< BILL"
757 IF RX$ = "D" THEN MID$(HF$,9
,7) = "DEPOSIT"
758 PRINT HF$
760 J=INSTR(11,LI$,CHR$(127))
765 CA=VAL(MID$(LI$,11,J-11))/10
0:SL=64
770 CI$=MID$(LI$,10,1):IF CI$="Y
" THEN CD$="' ' YES" ELSE CD$="'
*'NO"
800 I=INSTR(17,LI$,CHR$(127)):CP
$=MID$(LI$,17,I-17)
860 CF$=RIGHT$(LI$,(LEN(LI$)-I))
880 PRINT @224,"NUMBER  DATE CLE
ARED    AMOUNT"
900 PRINT @256," ";SN$;"   ";MM$
;"/";DD$;" ";CD$;" ";
910 PRINT USING "##,###.##";CA
915 PRINT @288," ":FOR J=1 TO 4:
PRINT " ":NEXT J
920 IF RT$="CHECK" THEN PRINT @2
88,"PAID TO: ";CP$:PRINT @352,"P
AID FOR: ";CF$
930 IF RT$="DEPOSIT" THEN PRINT
@288,"SOURCE: ";CP$
940 IF RT$="BILL" THEN PRINT @28
8,"FROM: ";CP$:PRINT @352,"FOR:"
;CF$
960 PRINT @192,"—";RT$;" DET
AILS —"
980 LI$(1)="1. RETURN TO PREVIOU
S SCREEN"
990 LI$(2)="2. RUN THE DATABASE
UPDATE"
1000 LI$(3)="3. END THIS SESSION
":NL=3:GOSUB 9020
1020 ON A GOTO 470,440,340
1022 CLS:PRINT "*** ";RT$;" ";SN
$;" ";MM$;"/";DD$;" NOT FOUND"
1030 SL=128:GOTO 980
1035 FOR I=1 TO 7:RV(I)=0:NEXT I
1040 CLS:ST=0:NS$=RIGHT$("    "+
RT$,7)
1045 PRINT @0,"—FIND ";NS$;"S W
ITHIN A RANGE—
1050 PRINT @31,"r":ST=0
1060 LI$(1)="1. BY "+RT$+" NUMBE
R":LI$(2)="2. BY DATE"
1080 LI$(3)="3. BY CLEARED/UNCLE
ARED":LI$(4)="4. BY AMOUNT"
1100 LI$(5)="5. BY PAID TO OR FR
OM":LI$(6)="6. BY PURPOSE"
1110 LI$(7)="7. PRINT TOTALS":LI
$(8)="8. CONTINUE"
1112 IF RV(8)=3 THEN LI$(6)="6.
# NOT USED #"
1115 FOR I=1 TO 7:IF RV(I) <> 0
THEN MID$(LI$(I),3,1)="*"
1118 NEXT I
1120 NL=8:SL=64:GOSUB 9020
1140 ON A GOTO 1160,1260,1440,14
80,1580,1680,1155,1780
1155 IF RV(7)=0 THEN RV(7)=1 ELS
E RV(7)=0
1157 GOTO 1040
1160 P$="ENTER LOWEST NUMBER 100
0-9998":SL=320:VT$="N"
1180 LV=1000:HV=9998:GOSUB 9220:
LN$=VA$
1200 P$="ENTER HIGHEST NUMBER "+
STR$(INT(VV+1))+"-9999"
1220 SL=320:VT$="N":LV=VV+1:HV=9
999:GOSUB 9220:HN$=VA$
1240 RV(1)=1:GOTO 1040
1260 P$="ENTER LOWEST MONTH 1-11
":SL=320:VT$="N"
1280 HV=11:LV=1:GOSUB 9220:LM$=R
IGHT$("0"+VA$,2)
1300 P$="ENTER LOWEST DAY 1-30":
SL=320:VT$="N"
1320 LV=1:HV=30:GOSUB 9220:LD$=R
IGHT$("0"+VA$,2)
1340 P$="ENTER HIGHEST MONTH 1-1
2":SL=320:VT$="N"
1360 HV=12:LV=1:GOSUB 9220:HM$=R
IGHT$("0"+VA$,2)
1380 P$="ENTER HIGHEST DAY 1-31"
:SL=320:VT$="N"
1400 LV=1:HV=31:GOSUB 9220:HD$=R
IGHT$("0"+VA$,2)
1420 RV(2)=1:LX$=LM$+LD$:HX$=HM$
+HD$:GOTO 1040
1440 P$="ENTER 'Y' OR '*'":SL=32
0:VT$="A":HV=1
1460 GOSUB 9220:CC$=VA$:RV(3)=1:
GOTO 1040
1480 P$="ENTER LOWEST AMOUNT":SL
=320:VT$="D"
1500 LV=1:HV=99999.99:GOSUB 9220
:LA=VV
1520 P$="ENTER HIGHEST AMOUNT":S
L=320:VT$="D"
1540 LV=1:HV=99999.99:GOSUB 9220
:HA=VV
1560 RV(4)=1:GOTO 1040
1580 P$="ENTER LOW VALUE OF TO/F
ROM":SL=320:VT$="A"
1600 HV=24:GOSUB 9220:LT$=VA$
1620 P$="ENTER HIGH VALUE OF TO/
FROM":SL=320:VT$="A"
1640 HV=24:GOSUB 9220:HT$=VA$
1660 RV(5)=1:GOTO 1040
1680 IF RV(8)=3 THEN GOTO 1040
1690 P$="ENTER LOW VALUE PAID FO
R":SL=320:VT$="A"
1700 HV=58:GOSUB 9220:LF$=VA$
1720 P$="ENTER HIGH VALUE PAID F
OR ":SL=320:VT$="A"
1740 HV=58:GOSUB 9220:HF$=VA$
1760 RV(6)=1:GOTO 1040
1780 CLS:PRINT "——— SEARC
HING ———":PL=64:CLOSE #1
1790 RC=0:ON RV(2) GOTO 1820
1800 SG$="M01D01/CHK":GOTO 1860
1820 IF LD$ > "15" THEN DD$ = "1
5" ELSE DD$ = "01"
1840 MM$=LM$:SG$ = "M"+MM$+"D"+D
D$+"/CHK"
1860 OPEN "I",#1,SG$
1862 IF RV(8) = 4 THEN GOTO 3105
1863 IF RV(8) = 5 THEN GOTO 4105
1865 PL=1:GOSUB 1866:GOTO 1880
1866 PRINT @0,"——   SEARCH
FOUND ——"
1867 PRINT @2,RT$;
1868 PRINT @32,"DATE NUMBR CD
AMOUNT     ";
1870 IF RV(8) = 1 THEN PRINT "TO
" ELSE PRINT "FROM":RETURN
1879 'RI=1 RECORD FOUND - PRINT,
```

```
 RI=2 END-OF FILE
1880 GOSUB 10280:ON RI GOTO 1900
,2020
1900 RC=RC+1:PL=PL+1
1920 J=INSTR(10,LI$,CHR$(127)):K
=INSTR(J+1,LI$,CHR$(127))
1940 PRINT @(32*PL),LEFT$(LI$,2)
;"/";MID$(LI$,3,2);" ";
1950 PRINT MID$(LI$,6,4);" ";MID
$(LI$,10,1);" ";
1952 CA=VAL(MID$(LI$,11,J-11))
1955 PRINT USING "##,###.## ";CA
/100;
1960 ST=ST+CA
1980 PRINT LEFT$(MID$(LI$,J+1,K-
J-1),9);
1990 IF PL< 14 THEN GOTO 1880
1992 PRINT @480,"PRESS ANY KEY T
O CONTINUE";
1994 A$=INKEY$:IF A$="" THEN GOT
O 1994
1996 CLS:GOSUB 1866:PL=2:GOTO 18
80
2020 IF RC=0 THEN PRINT "** NO R
ECORDS IN THIS RANGE"
2022 IF RV(7) = 0 THEN PRINT @48
0,"-END OF SELECT - PRESS ANY KE
Y-";
2024 IF RV(7) = 1 THEN PRINT @48
0,"PRESS ANY KEY";:PRINT USING "
##,###.##";ST/100;:PRINT "  TOTA
LS";
2030 CLOSE #1
2040 A$=INKEY$:IF A$="" THEN GOT
O 2040 ELSE GOTO 470
3000 CLS5:PRINT @0,"— SPECIA
L  REPORTING ——x
3002 LI$(1)="1. CHECKS & DEPOSIT
S (STATEMENT)
3004 LI$(2)="2. CHECKS & BILLS
  (BALANCE)
3006 LI$(3)="3. RETURN TO THE MA
IN MENU
3008 LI$(4)="4. RUN THE DATABASE
 UPDATE
3010 LI$(5)="5. END THIS SESSION
3011 CT=0:BT=0:DT=0:OB=0:RC=0
3012 RT$="RECORD":SL=96:NL=5:GOS
UB 9020
3014 ON A GOTO 3020,4000,160,440
,340
3020 FOR I=1 TO 7:RV(I)=0:NEXT I
3030 CLS0:PRINT "— OPENING B
ALANCE? ——y
3040 LI$(1)="1. ENTER AN OPENING
 BALANCE
3050 LI$(2)="2. ENTER RECORD SEL
ECTION RANGES
3060 LI$(3)="3. RETURN TO REPORT
ING MENU-x
3070 SL=128:NL=3:GOSUB 9020
3072 ON A GOTO 3080,3100,3000
3080 P$="BALANCE ( . PLUS 2 DECI
MALS REQUIRED)":SL=320:VT$="D"
3090 LV=1:HV=99999.99:GOSUB 9220
:OB=VV:GOTO 3030
3100 RV(8)=4:GOTO 1040
3105 GOSUB 3900
3110 GOSUB 10280:ON RI GOTO 3120
,3250
3120 RC=RC+1:PL=PL+1
3130 J=INSTR(10,LI$,CHR$(127)):K
=INSTR(J+1,LI$,CHR$(127))
3140 PRINT @(32*PL),LEFT$(LI$,2)
;"/";MID$(LI$,3,2);" ";
3150 PRINT MID$(LI$,6,4);" ";MID
$(LI$,10,1);"  ";
3160 CA=VAL(MID$(LI$,11,J-11))
3170 IF MID$(LI$,5,1)="C" THEN P
RINT "          ";
3180 PRINT USING "#####.##";CA/1
00;
3190 IF MID$(LI$,5,1)="C" THEN C
T=CT+CA ELSE DT=DT+CA
3210 IF PL< 14 THEN GOTO 3110
3220 PRINT @480,"PRESS ANY KEY T
O CONTINUE";
3230 A$=INKEY$:IF A$="" THEN GOT
O 3230
3240 CLS:GOSUB 3900:GOTO 3110
3250 IF RV(7)=0 THEN PRINT " ":G
OTO 3270
3255 PRINT " ":PRINT "SUBTOTALS
    ";
3257 PRINT USING "#####.##";DT/1
00;
3260 PRINT USING " #####.##";CT/
100
3265 PRINT "OP BAL/TOTALS ";
3266 PRINT USING "#####.##";OB;
3267 FT=OB+((DT-CT)/100)
3268 PRINT USING " #####.##";FT
3270 IF RC=0 THEN PRINT "** NO R
ECORDS IN THIS RANGE
3275 PRINT "-END OF SELECT - PRE
```


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Issues July 1981 through June 1982 are available on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent sales tax. In order to hold down costs, we do not bill, and no C.O.D. orders are accepted.
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```
SS ANY KEY-";:CLOSE#1
3280 A$=INKEY$:IF A$="" THEN GOT
O 3280 ELSE GOTO 3000
3900 CLS:PRINT "- CHECK/DEPOSI
T REPORT --"
3910 PRINT @32,"DATE  NMBR CD  D
EPO-AMT CHCK-AMT"
3920 PL=1:RETURN
4000 RV(8)=5:FOR I=1 TO 7:RV(I)=
0:NEXT I
4100 GOTO 1040
4105 GOSUB 4900
4110 GOSUB 10280:ON RI GOTO 4120
,4250
4120 RC=RC+1:PL=PL+1
4130 J=INSTR(10,LI$,CHR$(127)):K
=INSTR(J+1,LI$,CHR$(127))
4140 PRINT @(32*PL),LEFT$(LI$,2)
;"/";MID$(LI$,3,2);" ";
4150 PRINT MID$(LI$,6,4);" ";MID
$(LI$,5,1);MID$(LI$,10,1);" ";
4160 CA=VAL(MID$(LI$,11,J-11)):T
F$=MID$(LI$,J+1,K-J-1)
4170 PRINT LEFT$(TF$+"          ",
9);
4175 IF MID$(LI$,5,1)="C" THEN P
C=-1*CA/100 ELSE PC=CA/100
4180 PRINT USING "#####.##";PC;
4190 IF MID$(LI$,5,1)="C" THEN C
T=CT+CA ELSE DT=DT+CA
4210 IF PL< 14 THEN GOTO 4110
4220 PRINT @480,"PRESS ANY KEY T
O CONTINUE";
4230 A$=INKEY$:IF A$="" THEN GOT
O 4230
4240 CLS:GOSUB 4900:GOTO 4110
4250 IF RV(7)=0 THEN GOTO 4270
4255 PRINT " BILL TOTAL
  ";:PRINT USING " ######.##";DT
/100
4260 PRINT "CHECK TOTAL
 ";:PRINT USING " ######.##";-CT
/100
4265 PRINT "OUTSTANDING AMOUNT
  ";
4267 FT=((DT-CT)/100):PRINT USIN
G " ######.##";FT
4270 IF RC=0 THEN PRINT "** NO R
ECORDS IN THIS RANGE
4275 PRINT "-END OF SELECT - PRE
SS ANY KEY-";:CLOSE#1
4280 A$=INKEY$:IF A$="" THEN GOT
O 3280 ELSE GOTO 3000
4900 CLS:PRINT "--- CHECK/BIL
L REPORT --"
4910 PRINT @32,"DATE  NMBR TC DE
SCRIP     AMOUNT"
4920 PL=1:RETURN
9020 FOR I= 1 TO NL:PRINT @SL,LI
$(I)
9040 SL= SL+32:NEXT I
9060 PRINT @32,"*   SELECT FROM
THE FOLLOWING"
9080 FOR I = 1 TO 200
9100 A$ = INKEY$:IF A$ <> "" GOT
O 9180 ELSE NEXT I
9120 PRINT @32," ":FOR I = 1 TO
65
```

works. You can use DATAB and RETRV as a guide and let your imagination do the rest. Though your data is different, the flow from menu to menu is followed pretty much as it is. Start by creating your Data Dictionary and formulate your set of database rules.

To use a printer for output, follow the manufacturer's print codes. These control such things as lines per inch, characters per inch, lines per page, page eject, print format, tabulation, etc. Now that you are no longer a beginner, look at the disk manual. It has many useful techniques to incorporate into your system to make managing information easier. There are many sophisticated methods of placing data on a disk. This one gets the job done and I hope you find it helpful.

Off-the-Shelf Packages

Even though you know how to modify this database, you may find it simpler to purchase a ready-to-use database system. They are relatively inexpensive, fast and feature-packed; however, if the system isn't designed to do what you need it to, it is of no use. There are several database programs that run on the CoCo. They are listed in advertisements in RAINBOW. Each system has its advantages and disadvantages.

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

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- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

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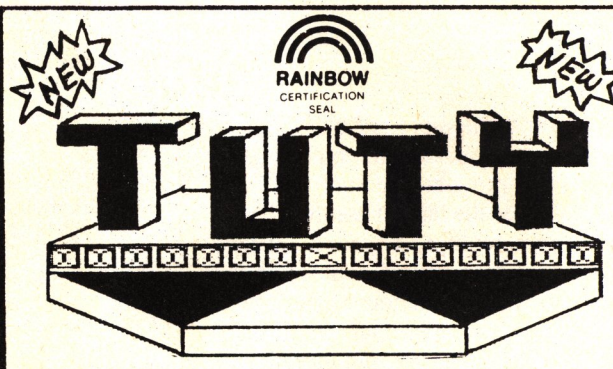

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Now I will point out some things to take into consideration.

Make sure the product is for use on your particular CoCo. Determine the memory size and type of computer required. (Does it require OS-9 or 128K?) Create a Data Dictionary to determine the information you need to process the system. Check the database system specification to see whether the system works with records of that type

Some systems use a data compression technique, which lets you put more information on a disk than is normally possible. This is important if you plan to use a single disk and have a lot of data.

and size. Write the supplier for descriptive information and make sure you can get a refund if the product does not suit your needs. Estimate the largest number of records you have, multiply it by the number of characters in each record and see if the system can store this amount of information. Some systems use a data compression technique, which lets you put more information on a disk than is normally possible. This is important if you plan to use a single disk and have a lot of data. See if the system splits a database over several disks.

Draw up some sample reports and make sure the program can produce them. It is important to make sure the printer you plan to use is supported by the system. Try the system out or talk to someone else who uses it; some systems are easier to use than others. See if there is a number you can call if you have any problems. Most of these systems have been around for a while, so I don't think you'll have many problems.

End of the Road

My next project is to revise the database to keep track of my wife's videotapes. I know we have *Trouble With Tribbles . . .* somewhere. ❑

```
9140 A$ = INKEY$:IF A$ <> "" GOT
O 9180 ELSE NEXT I
9160 GOTO 9060
9180 A = VAL(A$):IF A > 0 AND A
< NL+1 THEN RETURN
9200 GOTO 9060
9220 PRINT @SL,P$ 'PROMPT FOR VA
RIABLE
9240 PRINT @SL+32," " 'CLEAR LIN
E
9260 PRINT @SL+32,""; 'REPOSITIO
N CURSOR
9280 LINE INPUT "==> ";VA$ 'INPU
T THE VARIABLE
9300 LA= LEN(VA$):IF VT$ = "D" G
OTO 9460
9320 IF VT$ = "N" GOTO 9380
9340 IF LA > INT(HV) GOTO 9220
9360 RETURN 'VARIABLE IS IN RANG
E
9380 VV= VAL(VA$)
9400 IF VV < LV GOTO 9220
9420 IF VV > HV GOTO 9220
9440 GOTO 9360
9460 IF LA > 9 OR LA < 3 GOTO 92
20
9480 IF MID$(VA$,LA-2,1) <> "."
GOTO 9220
9500 GOTO 9380
9800 IF DD$ > "15" THEN DF$ = "1
5" ELSE DF$ = "01"
9820 SG$ = "M" + MM$ + "D" + DF$
 + "/CHK"
9840 CLOSE:OPEN "I",#1,SG$:RETUR
N
9860 'AD=1 LOCATE, 2 CHANGE, 3 D
ELETE
9880 'RA 1 ADDED,CHANGED,DELETED
  0 NO ACTION
9900 IF EOF(1) = -1 GOTO 9990
9920 INPUT #1,LI$:IK$ = LEFT$(LI
$,9)
9940 IF IK$<MK$ THEN GOTO 9900
9960 IF IK$=MK$ THEN GE=1 ELSE G
E =2
9980 CLOSE:RETURN
9990 GE=2:CLOSE:RETURN
10000 IF IK$ < LK$ OR IK$ > HK$
GOTO 9900
10020 RC=RC+1:WRITE #2,LI$:GOTO
9900
10040 MV=VAL(MM$)
10060 IF MV = 12 AND DF$ ="15" T
HEN RETURN
10080 IF MV = 12 THEN DF$ = "15"
10100 IF DF$ = "01" THEN DF$ = "
15" ELSE MV=MV+1
10120 MM$ = RIGHT$(STR$(MV+100),
2):CLOSE #1
10140 SG$ = "M" + MM$ + "D" + DF
$ + "/CHK"
10160 OPEN "I",#1,SG$:GOTO 9900
10180 IF RV(2) = 1 THEN GOTO 102
00 ELSE MM=1:DD=1:GOTO 10220
10200 MM=VAL(LM$):IF LD$ < 16 TH
EN DD=1 ELSE DD=15
10220 SG$ = "M" + RIGHT$("0"+STR
$(MM),2) + "D" + RIGHT$("0"+STR$
(DD),2)+"/CHK"
10240 FOR I = 1 TO 6:IF MID$(SG$
,I,1)= " " THEN MID$(SG$,I,1)="0
"
10260 NEXT I:CLOSE #1:OPEN "I",#
1,SG$
10280 A$=INKEY$:IF A$="" THEN R
I=2:RETURN 'FORCED RETURN
10282 IF EOF(1) = -1 GOTO 10680
'CHANGE FILES?
10300 INPUT #1,LI$:RI=0:RJ=0 '
EXAMINE RECORD
10310 ON RV(1) GOSUB 10380 'CHEC
K #
10312 ON RV(2) GOSUB 10430 'DATE
10313 IF RI=2 THEN RETURN
10314 ON RV(3) GOSUB 10440 'CLEA
RED
10316 ON RV(4) GOSUB 10480 'AMOU
NT
10318 ON RV(5) GOSUB 10560 'PAID
 TO
10319 ON RV(6) GOSUB 10600 'PURP
OSE
10320 IN$=MID$(LI$,5,1)
10322 ON RV(8) GOSUB 10520,10530
,10540,10550,10556 'TYPE
10326 IF RJ <> 0 THEN GOTO 10280
10340 RI=1:RETURN
10380 IN$=MID$(LI$,6,4) 'NUMBER
10400 IF IN$ < LN$ OR IN$ > HN$
THEN RJ=1
10420 RETURN
10430 IN$=LEFT$(LI$,4)
10432 IF IN$ < LX$ THEN RJ=1:RET
URN
10434 IF IN$ > HX$ THEN RI=2:RET
URN
10436 RETURN 'HIT
10440 IN$=MID$(LI$,10,1) 'CLEARE
D INDICATOR
10460 IF IN$ <> CC$ THEN RJ=1
10470 RETURN
10480 I=INSTR(11,LI$,CHR$(127))
10490 IN = VAL(MID$(LI$,11,I-11)
)/100
10500 IF IN < LA OR IN > HA THEN
 RJ=1
10510 RETURN
10520 IF IN$ <> "C" THEN RJ=1:RE
TURN ELSE RETURN
10530 IF IN$ <> "B" THEN RJ=1:RE
TURN ELSE RETURN
10540 IF IN$ <> "D" THEN RJ=1:RE
TURN ELSE RETURN
10550 IF IN$  = "B" THEN RJ=1:RE
TURN ELSE RETURN
10556 IF IN$  = "D" THEN RJ=1:RE
TURN ELSE RETURN
10560 J=1+INSTR(11,LI$,CHR$(127)
):K=INSTR(J+1,LI$,CHR$(127))
10570 IN$=MID$(LI$,J,K-J)
10580 IF IN$ < LT$ OR IN$ > HT$
THEN RJ=1
10590 RETURN
10600 J=1+INSTR(11,LI$,CHR$(127)
):K=INSTR(J+1,LI$,CHR$(127))
10620 J=LEN(LI$):IN$=RIGHT$(LI$,
J-K)
10640 IF IN$ < LF$ OR IN$ > HF$
THEN RJ=1
10660 RETURN
10680 IF LEFT$(SG$,6)="M12D15" T
HEN RI=2:RETURN
10700 MM=VAL(MID$(SG$,2,2)):DD=V
AL(MID$(SG$,5,2))
10720 IF DD=1 THEN DD=15:GOTO 10
760
10740 IF DD=15 THEN DD=1:MM=MM+1
10760 MM=100+MM:DD=100 + DD
10770 RS$=RIGHT$(STR$(MM),2)
10780 MID$(SG$,2,2)=RS$
10790 RS$=RIGHT$(STR$(DD),2)
10800 MID$(SG$,5,2)=RS$
10820 CLOSE #1:OPEN "I",#1,SG$:G
OTO 10280
```

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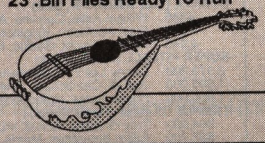

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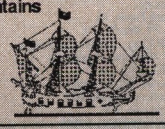

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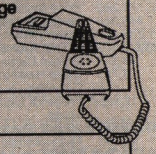
TELECOMMUNICATIONS 1-3

T1 - Haysae, Kermit, Mikeyterm, TeleTerm
T2 - Cobbs BBs Terminal Package
T3 - GETERM Communications



GRAPHICS 1-14

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GR2 - 12 Basic Graphic Programs
GR3 - 9 Coco 3 Graphic Programs
GR4 - 22 Coco Max Pictures
GR5 - 22 Coco Max Pictures
GR6 - 22 Coco Max Pictures
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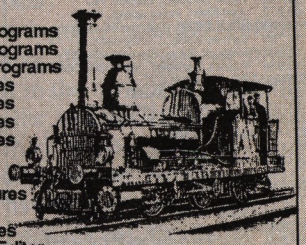
GR9 - 22 .Bin Pictures
GR10 - 14 Large .Bin Pictures
GR11 - 8 Mge Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures



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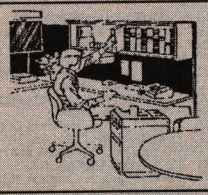

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GA10 - Blockade, Fly, Missile2, Pong, +
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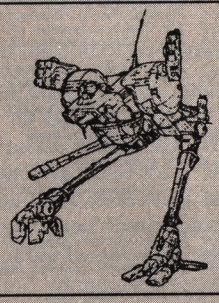

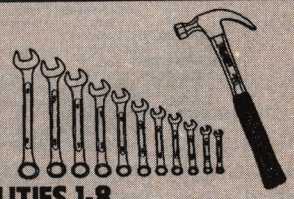

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M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
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386,700 Jason Downs, Albany, NY
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Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite microdiversion. We want to put your best effort on record in THE RAINBOW's bimonthly "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your full name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG>prompt, pick MAIL, then type SEND and address to: EDITORS.

SCOREBOARD POINTERS

In conjuction with THE RAINBOW's Scoreboard, we offer this bi-monthly column of pointers for game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• Amanda Russo: In *Dallas Quest* try waving the ring at the natives in front of the cave entrance. When at the cave use the torch to heat the eggs.

• Drax Felton: In *Dallas Quest* pull the curtain and get the light at the trading post. Bribe the monkey to open the secret door. Carry only the light down the ladder, then turn the light on and leave it. Next, go east back into the trading post, put everything into the sack, close it, take it and use the ladder again. This time take the light and go west.

Farrell Kenimer
Phoenix

• Greg Dorsha: In *The Black Sanctum*, it sounds to me like your program is damaged. Mine allows me to enter the mirror. Does anyone know what to do after dropping the ashes in the circle?
In *Vortex Factor*, search every bookcase you come upon — they all contain cartridges. In 1967 search the bookcase, get the pink cartridge, use it, and you'll be in the far future. Go south with the sandwich and give it to the mutant humanoid or else he'll kill you. He will eat the sandwich and give you a white cartridge. Use the white cartridge and you'll be in total darkness. Does anyone know what to do from here? I know I'm in ancient Egypt because when I moved in the dark, I died and saw my body in a mummy tomb.
In *Trekboer*, how do you get past the first grate?

Jason Kessler
Staunton, Virginia

• Nathan King: To get past the second level of *Castle of Tharoggad*, there is a secret door that leads to a room with the passage. I have been through every level of the castle and have found no item that will reveal these passages. You just have to try until you find one. As for the magic match, keep it stowed in your backpack until you reach the eighth floor. It is on this level that you will find a magic torch. Once you have the magic torch in one hand and the magic match in the other, incant the magic match and the torch ignites. Then you have to find the good wizard, who is behind bars. He can only be seen with the magic torch. Be forewarned that in order to get him out you need the key from Level four. Incant the key and you'll see the good wizard behind the bars. Good luck, and always remember to go through a dead end or a side wall because there may be a secret door.

James McCarthy
DuBois, Pennsylvania

• Tony Durst: In *Lansford Mansion*, to temporarily get rid of the guard, `YELL FIRE`.
In *Dungeons of Daggorath*, whenever returning to any level previously cleared of creatures, you will find new groups of beasts. A few (1-6) will be very strong. Bring lots of objects (18-20), drop them at your feet as all beasts except scorpions (the wizard's image and the wizard too) will pick them up before attacking. To see a goldrog, wraith or scorpion use at least a lunar torch. A blob, weak stone giant, etc. may be a pal — his attacks won't harm you. Lead your pal away from your pile of objects. Turn your light off, and wait in the dark for beasts to line-up down the hallways. When ready to start picking them off, turn around (`T A`), so that you begin an attack sequence with move back (`M B`), and finish it with move (`M`). This allows time for an extra attack or two, and a quick return to the safety of a pal — repeat!

• Peter Menning: In *Hitchhikers Guide to the Galaxy* all four kinds of fluff must be put in the flowerpot (brought back from the whale's stomach with the thing). Wait and it will grow. Take it to the sauna, wait and it will blossom. You may have to upgrade the transporter with real tea before visiting the whale.

• Andrew Yarrows: In *Raakatu* the rug is a distraction. You can't cross it or use the door beyond.
In *Mr. Corey* near the end of the game, when we chase after him in a helicopter, we always crash. We've tried a number of things, but nothing works,
In *Night of the Living Dead* we have timed the burning of the barn to attract the rescue helicopter, and climbed into it from the roof of the house. We have talked the pilot into taking us to safety — even different locations — but he always lands in the same place, and the zombies get us.

Lin & Nan Padgett
Peachtree City, Georgia

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers" c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue. For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the Mail section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick Mail, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

Loan Procedures for *MVFinance*

by Dale L.Puckett
Contributing Editor

It's nice to be back online after my recent move from Maryland to Kansas. This month let's jump right in where we left off in my last article and deliver the remaining procedures for *MVFinance*.

I wrote *MVFinance* to demonstrate a few of the new features in the `gfx2` module that should be released as part of the new OS-9 package I mentioned in March. My sources tell me that Paul Ward, author of *Start OS-9*, is writing the documentation now. This means it should be easy to use and completed soon.

In the meantime I have convinced Kevin Darling, author of the new `gfx2` package, to release an `IPatch` file that lets you modify and use your original `gfx2` file while you're waiting for the new OS-9. It's being uploaded to both Delphi and CompuServe as I write this.

MVFinance is a BASIC09 tutorial, so I used several methods to open windows and perform the requested functions. All functions under the Investment and Depreciation menus are written as subroutines that run in overlay windows. Under the Loan menu I open a path to a new device window, define the window and then open a path to it. When you do this you must first save the standard input, output and error paths to your original window. Then you can fork a new process running the requested program.

There are many ways to run the programs. You can leave the procedures you want to run in BASIC09 source code form and load them into the workspace you are using for the menu program that will drive them. When you do this you can run them with the standard BASIC09 `RUN` command. This month, however, I chose to let you enter the procedures and then pack them. Once you do this, you can run them from the OS-9 command line or fork a Shell to run them from within BASIC09.

Notice that I used the ampersand (&) each time I assigned a procedure name to the variable program name. This tells OS-9 to run the procedure as another task and gives you a way to start several iterations of the same procedure running in different windows. To make it easy for you to test this theory, I put a `REPEAT ... UNTIL` loop in the procedure `RegPay`, which asks if you want to make any more calculations. You may answer Yes and do another calculation or you may press CLEAR to move back to the window containing the *MVFinance* main menu. If you return to the main menu, you may go to the Loan menu and ask to calculate Regular Payments again. *MVFinance* then opens another window with another iteration of the procedure `RegPay` running in it. This allows you to run a different set of loan terms in the new window and compare the result by pressing CLEAR to move between windows.

You could select any of the other menu items under the Loan menu, after which *MVFinance* opens a new window and runs the requested program for you. The other

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

OS-9 Level II 512K

Listing1: `Update1`

```
0000 5000 (* Loan Programs
0013      programname:=""
001A      IF menu_item=1 THEN
0027        programname:="RegPay &" \(* Regular Payment Procedure
0052      ELSE IF menu_item=2 THEN
0062          programname:="LastPay &" \(* Last Payment
0081        ELSE IF menu_item=3 THEN
0091            programname:="TermPay &" \(* Calculate term of loan
00BA          ELSE IF menu_item=4 THEN
00CA              programname:="Balance &" \(* Compute Loan Balance
00F1            ELSE IF menu_item=5 THEN
0101                programname:="Cost &" \(* Calculate cost of loan
0127              ENDIF
0129            ENDIF
012B          ENDIF
012D        ENDIF
012F      ENDIF
0131
0132      IF programname<>"" THEN GOSUB 7000 \ ENDIF
0143      RETURN
0145
0146
```

Listing 2: Update2

```
0000 7000 (* Open a new window
0017      OPEN #newpath,"/w"
0022      RUN gfx2(newpath,"DWSet",7,1,2,60,16,1,0,2)
004C      RUN gfx2(newpath,"WnSet",WT_DBox,Finwin)
0068      RUN gfx2(newpath,"Select")
007B
007C      (* open a path to it and save paths to original window
00B2      FOR path=0 TO 2
00C4        stack.a:=path
00D0        RUN syscall(I_Dup,stack)
00DF        oldpath(path)=stack.a
00EF        CLOSE #path
00F6        stack.a:=newpath
0102        RUN syscall(I_Dup,stack)
0111      NEXT path
011C
011D      SHELL programname
0122      stack.x:=240
012E      RUN syscall(F_Sleep,stack)
013D
013E      (* Switch pack to original window
015F      FOR path:=0 TO 2
0171        CLOSE #path
0178        stack.a:=oldpath(path)
0188        RUN syscall(I_Dup,stack)
0197        CLOSE #oldpath(path)
01A2      NEXT path
01AD
01AE      CLOSE #newpath
01B5      RUN gfx2(0,"Select")
01C6      RETURN
01C8
```

four procedures called from the Loan menu do not contain the query loop, but let you exit back to *MVFinance* by clicking the mouse button.

Another way to fork a new process and run another program from within BASIC09 involves the redirection of all three standard paths to a process. This method does not require you to save the same paths, but you do need the name of the next device window. This means you will need to use `SysCall`. I'll try to come up with an example for you in a future column.

To run this month's code add subroutine 5000, listed as `Update1`, and subroutine 7000, listed as `Update2`, to the *MVFinance* code published in April. Then enter the code for the five new procedures, save them and pack them into a BASIC09 I-code module in `/dd/CMDS`.

That's it for July. Next month our contribution to THE RAINBOW's OS-9 issue takes a close look at the OS-9 Level II windowing system on the CoCo 3. Till then, keep on hacking! ❑

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OS-9 Spotlight — File System Repack

This month I spotlight another fine product from Chris Burke. *File System Repack* gives you eight new tools for optimizing the performance of your OS-9 disks. Repack, the most important program in the package, scans the file system on your OS-9 disks and rewrites any fragmented files or directories.

Once Repack optimizes a file, the file

. . . eight new tools for optimizing the performance of your OS-9 disks.

remains optimized until you edit or modify it. Repack preserves the general order of your disk files and does not change their order in your directory. Instead it sorts files in order of increasing file descriptor sector address.

Repack does not require any free space on your disk to operate. This means you can optimize disks that are completely full. It works on any OS-9 hard disk as well as all floppy disks. Additionally, it lets you reclaim lost sectors on your disk by using several command line options. In general, the more inefficiently the data is stored on your disk, the greater the improvement you'll notice after you run Repack.

The other seven utilities in Burke's *File System Repack* include BA, which lets you set bits in the allocation bitmap for a specified logical sector number or range of them; BD, which clears the allocation bitmap for any LSN; CCheck, which scans your disk for defective sectors and identifies any files stored in those sectors; HDB, a utility that lets you back up your hard or floppy disk to a number of smaller floppies with data compression; HDR, which restores files backed up with HDB; Stash, a tool for marking files or directories that shouldn't be repacked (OS9Boot for example); and Zap, a utility that erases a file's directory entry but does not deallocate the sectors used by the file.

Burke's package runs on either OS-9

Listing 3: loanprocs

```
PROCEDURE cost
 0000       DIM pay4,pay5,cost,rate1,rate2,costofborrowing:REAL
 001B       DIM principal,years,rate,pay:REAL
 002E       DIM numofpayments,months,payperyear,count:INTEGER
 0041       DIM valid,fire,mx,my:INTEGER
 0054
 0055       PRINT CHR$(12) \ PRINT "Cost of borrowing" \ PRINT
 0071       INPUT "How much are you borrowing? ",principal
 0095       INPUT "What is the term of the loan (Years, Months)? ",years
             ,months
 00CF       INPUT "What is the annual interest rate? ",rate
 00F9       INPUT "How many payments will you be making each year? ",payperyear
 0131
 0132       rate:=rate/payperyear/100
 0143       years:=(years*12+months)/12
 0158       pay3:=1/(1+rate)^(payperyear*years)
 0171       pay4:=principal*rate/(1-pay3)
 0185       pay5:=principal
 018D       cost:=0
 0195       numofpayments:=payperyear*years
 01A3
 01A4       FOR count:=1 TO numofpayments
 01B5         rate1:=INT(pay5*rate*100+.5)/100
 01D1         rate2:=pay4-rate1
 01DD         pay5:=pay5-rate2
 01E9         cost:=cost+pay4
 01F5       NEXT count
 0200
 0201       cost:=cost+pay5
 020D       costofborrowing:=cost-principal
 0219
 021A       PRINT CHR$(12)
 021F       PRINT "Regular Payments: ";
 0236       PRINT USING "T40,R12.2>",pay4
 0249       PRINT "Total Payments: ";
 025E       PRINT USING "T40,R12.2>",cost
 0271       PRINT "Cost of Borrowing: ";
 0289       PRINT USING "T40,R12.2>",costofborrowing
 029C       PRINT "Click Mouse to continue!"
 02B8
 02B9       REPEAT
 02BB         RUN gfx2("Mouse",valid,fire,mx,my)
 02DC       UNTIL fire=1
 02E7       RUN gfx2("Owend")
 02F4       END
 02F6

PROCEDURE balance
 0000       DIM principal,regularpay,rate,rate1,rate2:REAL
 0017       DIM count,paymentsperyear,paymentsmade:INTEGER
 0026       DIM valid,fire,mx,my:INTEGER
 0039
 003A       PRINT CHR$(12) \ PRINT "Remaining balance on a loan" \ PRINT
 0060       INPUT "Amount you borrowed? ",principal
 007D       INPUT "Annual interest rate? ",rate
 009B       INPUT "Number of payments per year? ",paymentsperyear
 00C0       INPUT "Amount of regular payment? ",regularpay
 00E3       INPUT "Number of payments made? ",paymentsmade
 0104
 0105       rate:=rate/paymentsperyear/100
 0116
 0117       FOR count:=1 TO paymentsmade
 0128         rate1:=INT(principal*rate*100+.5)/100
 0144         rate2:=regularpay-rate1
 0150         principal:=principal-rate2
 015C       NEXT count
 0167
 0168       PRINT CHR$(12)
 016D       PRINT "Your remaining balance is: ";
 018D       PRINT USING "T40,R12.2>",principal \ PRINT
 01A2       PRINT "Click Mouse to continue!"
 01BE
 01BF       REPEAT
 01C1         RUN gfx2("Mouse",valid,fire,mx,my)
 01E2       UNTIL fire=1
 01ED       RUN gfx2("Owend")
 01FA       END
 01FC

PROCEDURE TermPay
 0000       DIM principal,regularpay,rate,term1,term2,term:REAL
 001B       DIM periods,months,years:INTEGER
 002A       DIM valid,fire,mx,my:INTEGER
 003D
 003E       PRINT CHR$(12) \ PRINT "Term of a loan" \ PRINT
 0057       INPUT "How much are you borrowing? ",principal
 007B       INPUT "How much is your regular payment? ",regularpay
 00A5       INPUT "What is the annual interest rate? ",rate
```

```
00CF        INPUT "How many payment will you make a year? ",periods
00FE
00FF        rate:=rate/periods/100
0110        term1:=1-principal*rate/regularpay
0124        term2:=1+rate
0130        term:=-(LOG(term1)/LOG(term2))/periods
0144        months:=INT(term*12)
0152        years:=INT(months/12)
015F        months:=months-years*12
016E
016F        PRINT CHR$(12) \ PRINT "The term of your loan would be: ";
0199        PRINT USING "i4>",years;
01A6        PRINT " years";
01B1        PRINT USING "i4>"; months;
01BE        PRINT " months."
01CA        PRINT  \ PRINT "Click Mouse to continue!"
01E8
01E9        REPEAT
01EB          RUN gfx2("Mouse",valid,fire,mx,my)
020C        UNTIL fire=1
0217        RUN gfx2("Owend")
0224        END
0226

PROCEDURE LastPay
0000        DIM borrowed,years,rate,regularpay,interestpayment,payonprincipal
              ,payholder:REAL
001F        DIM months,periods,numberpayments,count:INTEGER
0032        DIM valid,fire,mx,my:INTEGER
0045
0046        PRINT CHR$(12) \ PRINT "Last Payment on a Loan" \ PRINT
0067        INPUT "Amount you are borrowing? ",borrowed
0089        INPUT "Length of loan (Years,Months)? ",years,months
00B4        INPUT "Annual interest rate? ",rate
00D2        INPUT "Number of payments per year? ",periods
00F7        INPUT "Amount of regular payment? ",regularpay
011A
011B        rate:=rate/periods/100
012C        years:=(years*12+months)/12
0141        numberpayments:=periods*years
014F
0150        FOR count:=1 TO numberpayments
0161          interestpayment:=INT(borrowed*rate*100+.5)/100
```

Level I or II as long as you have 42K of free memory. Make sure you are not running any other OS-9 programs when you use Repack. If another program accesses your disk while Repack is working, it could confuse Repack and cause you to lose data.

If you're running Repack on a hard disk, make sure you leave yourself plenty of time. For example, a heavily-fragmented, 20-megabyte hard disk that is half-full with 1500 files can take up to 12 hours to compress on a CoCo 3 running OS-9 Level II. When you're in a hurry, use the "-s" option on the Repack command line. This single pass option operates on a half-full, 20-megabyte hard disk with 1500 files in about 15 minutes. Each time you run a single pass on your hard disk you'll notice an incremental improvement in performance.

Chris Burke also delivers a bonus with Repack. The last chapter of the manual has a short but thorough explanation of how RBF and other parts of the OS-9 file system work.

If you've been working with heavily-fragmented disks and wondering why your system responds like molasses, give Burke & Burke's *File System Repack* a try. You'll be amazed how well your system operates after you run these utilities. ❑

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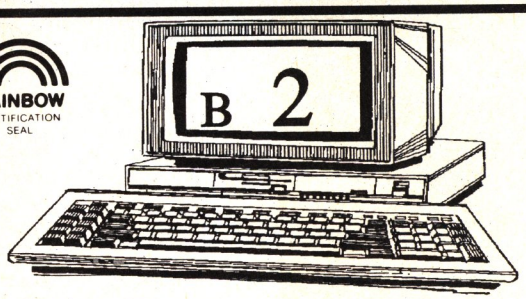

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```
017D          payonprincipal:=regularpay-interestpayment
0189          borrowed:=borrowed-payonprincipal
0195        NEXT count
01A0
01A1        payholder:=regularpay+borrowed
01AD
01AE        PRINT CHR$(12)
01B3        PRINT "Your last payment will be: ";
01D3        PRINT USING "T40,R12.2>",payholder \ PRINT
01E8        PRINT "Click Mouse to continue!"
0204
0205        REPEAT
0207          RUN gfx2("Mouse",valid,fire,mx,my)
0228        UNTIL fire=1
0233        RUN gfx2("Owend")
0240        END
0242

PROCEDURE regpay
0000        DIM amount,years,rate,holder,payment:REAL
0017        DIM months,periods:INTEGER
0022        DIM response:STRING[1]
002E
002F        PRINT CHR$(12) \ PRINT "Regular Payment on a Loan" \ PRINT
0053        INPUT "Amount needed? ",amount
006A        INPUT "Length of loan (Years,Months)? ",years,months
0095        INPUT "Annual interest rate? ",rate
00B3        INPUT "Number of payments per year? ",periods
00D8
00D9        rate:=rate/periods/100
00EA        years:=(years*12+months)/12
00FF        holder:=1/(1+rate)^(periods*years)
0118        payment:=amount*rate/(1-holder)
012C
012D        PRINT CHR$(12)
0132        PRINT "Your regular payment will be: ";
0155        PRINT USING "T40,R12.2>",payment \ PRINT
016A
016B        INPUT "Another Calculation? ",response
0188        IF response="Y" OR response="y" THEN
019D          RUN regpay
01A1        ELSE
01A5          END
```

Corrections

"Wrapping the RAINBOW" (May 1990, Page 92): Because of a production oversight, "Wrapping the RAINBOW" was incorrectly listed in the May 1990 Table of Contents as appearing on Page 124. The column actually appeared on Page 92 of that issue.

"Gravity Studio"(Advertisement, May 1990, Page 39): Many readers have called to enquire about the somewhat confusing address presented in the ad. Address any correspondence to Gravity Studio, P.O. Box 791, Belton, TX 76513.

MVCanvas 2.0 - OS-9 Paint Program

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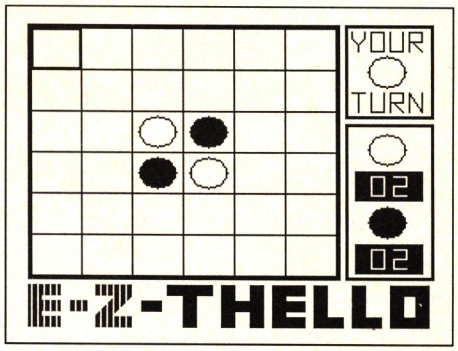
Old Game, New Twist

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*



Games are not the easiest programs to write, especially when you are starting from scratch. But after weeks of writing, I've come up with a brand new listing for a game familiar to many of you. I call the program *EZ-Thello.*

Many of you may already have CoCo programs similar to the classic game *Othello.* I have run across several, some of which have been listed right here in the pages of THE RAINBOW. I have always found the game fun, and even the very young can handle it.

In fact, many of my special needs students are able to play the game after only a few tries. I find the game helpful to them because it promotes the development of useful thought processes, which seems to be missing from chess and checkers.

However, one major drawback to clone games is that they take a long time to play. A standard *Othello*-style game is usually based on a 10-by-10 playing board. Since the game starts with four pieces on the board, it takes 96 moves to complete the game. This is entirely too long if the game is being used as a reward for students who complete their work early.

Thus the idea struck me to use a smaller game board. Instead of a 10-by-10 board with 100 squares, a smaller board of 6-by-6 with 36 squares only takes a fraction of the time to play. Also, the graphics are larger for the young to work with more easily.

With this concept in mind *EZ-Thello* was born. It is an easy-to-play version using only the arrow keys and the ENTER key. With 36 squares, only 32 moves are needed to complete a game. Even slow players usually finish in less than twenty minutes.

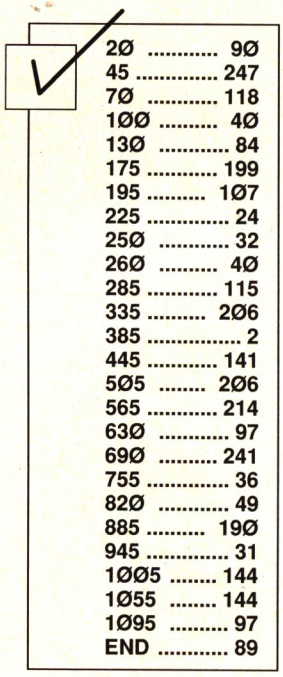
Problems

The biggest problem I had writing *EZ-Thello* was making a listing that did not borrow from other authors who may have written similar versions. To do so, I had to start completely from scratch and not refer to anyone else's listing.

This was not that difficult to do. Once I got the initial screen drawn, coming up with a movement routine for the keys was simple. What did pose a problem was coming up with a routine to check corresponding boxes for flips and legal moves. You see, whenever a piece is placed, the computer must check eight directions after it determines whether or not a box has been used.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

32K Extended



The Listing: EZTHELLO

```
1 REM**************************
2 REM*       E-Z-THELLO        *
3 REM*   COPYRIGHT (C)  199Ø   *
4 REM*         ADAPTED         *
5 REM*    BY FRED B. SCERBO    *
6 REM*    6Ø HARDING AVENUE    *
7 REM*  NORTH ADAMS, MA Ø1247  *
8 REM**************************
9 CLEAR5ØØ
1Ø CLSØ:PRINTSTRING$(32,22Ø);STR
ING$(32,2Ø4);
15 FORI=1TO16Ø:READA:IFA<128THEN
25
2Ø CLS:PRINT@96," GO BACK AND CH
ECK YOUR DATA IN  LINES 3Ø-5Ø. I
 THINK YOU MADE   A TYPO !":PRIN
T:PRINT:END
25 PRINTCHR$(A+128);:NEXT
3Ø DATA31,31,31,26,31,31,31,31,,
47,47,47,47,42,47,42,37,47,37,47
,47,47,37,47,32,37,47,,37,47,47,
```

```
47
35 DATA31,26,16,,,,23,30,,,37,47
,32,,47,42,37,47,37,47,32,,37,47
,32,37,47,,37,42,32,47
40 DATA31,31,26,28,24,23,30,16,2
8,24,37,47,32,,47,47,47,47,37,47
,47,42,37,47,32,37,47,,37,42,,47
45 DATA31,26,,,21,31,16,,,,37,47
,32,,47,42,37,47,37,47,32,32,37,
47,32,37,47,,37,42,,47
50 DATA31,31,31,26,21,31,31,31,,
,37,47,32,,47,42,37,47,37,47,47,
47,37,47,47,37,47,47,37,47,47,47
55 PRINTSTRING$(32,195);STRING$(
32,211);
60 PRINT@326," A SIMPLER VERSION
  ";:PRINT@358," OF A CLASSIC GA
ME  ";
65 PRINT@390,"       ADAPTED
  ";
70 PRINT@422,"  BY FRED B.SCERBO
  ";:PRINT@454," COPYRIGHT (C) 1
990 ";
75 X$=INKEY$:IFX$<>CHR$(13)THEN7
5
80 CLS:PRINT@231,"PLEASE STAND B
Y !";
85 DIM SQ(6,6),A(6),B(6),N$(9)
90 REM WH=1:BL=2
95 SQ(3,3)=1:SQ(4,4)=1:SQ(3,4)=2
:SQ(4,3)=2
100 N$(0)="U12R8D12NL8BR6":N$(1)
="BR3R3U12NG3D12R3BR5":N$(2)="NR
8U6R8U6NL8BD12BR6":N$(3)="R8U6NL
8U6NL8D12BR6":N$(4)="BU6NU6R8U6D
12BR6":N$(5)="R8U6L8U6R8BD12BR6"
105 N$(6)="R8U6L8D6U12R6BD12BR6"
:N$(7)="BR8U12L8ND2R8D12BR6":N$(
8)="NU12R8U6NL8U6NL8D12BR6":N$(9
)="BR8U12L8D6R8D6BR6"
110 PMODE4,1:PCLS1:SCREEN0,0
115 LINE(0,0)-(196,160),PRESET,B
120 LINE(1,1)-(195,159),PRESET,B
125 FORI=2TO194STEP32
130 LINE(I,2)-(I,158),PRESET:NEX
T
135 FORI=2TO158STEP26:LINE(2,I)-
(194,I),PRESET:NEXT
140 B=1
145 FORY=15TO145STEP26
150 B(B)=Y:B=B+1:NEXT
155 A=1
160 FORI=18TO178STEP32
165 A(A)=I:A=A+1:NEXT
170 DRAW"BM0,190C0U26R20D6L12D4R
12D6L12D4R12D6NL20BU10BR6R12U6L1
```

It must check up, down, left, right and four ways diagonally.

I found that the quickest way to do this was to actually play the game twice in memory. One version is a two-dimensional array (6-by-6) that stores the values of the pieces and their colors. The second version is the graphics screen that mirrors what is actually happening in the array.

Keep in mind that your computer screen is actually only an output device that translates what is in the chips to something you can understand. The game board, in this case, is just the output version of the numerical array.

The actual checking of the array is done with a series of counting loops. With a little effort I could have probably done it with nested loops, but a deadline every four weeks makes such creativity rather difficult. Besides, the listing you have flows logically although it is long.

I did not include any sound in this version, but those of you with a little creativity

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could add the SOUND or PLAY command in various locations to spice up the program. Keep in mind, however, that sound slows down the game's execution.

Once the listing is bug-free, you may want to save a copy with the high-speed poke included. Do this only if you have the program already saved without it. CoCo 3 owners can add 0 POKE 65497,0 as the first line, while CoCo 1 and 2 users can add 0 POKE 65495,0. Always be sure to power down before trying anything else with your CoCo after playing this game.

Playing the Game

I include a set of instructions at the start of the game for those who do not know how to play the game or do not have this article with them when they play it.

Pressing P for Pass allows players to switch turns or skip turns, say, if black wants to go first. Also, pressing E for End lets you end the game early, which is nice if neither side can make a legal move. The game is designed for two players. In time I will develop a version that lets you play against the computer.

In a nutshell, your object is to trap one or more of your opponent's colored pieces between two of yours. When you do, your opponent's pieces flip over to your color.

The nice part about using the computer is that no legal flips are missed as can happen on a board game. Also, you cannot make an illegal move. If no legal move is available, use P to pass the turn to your opponent. When the board is full or you press E, the game is over. Pressing ENTER restarts the game.

Conclusion

EZ-Thello should provide hours of fun for both young and old. In time, it should provide opportunity for even two siblings to work together on the CoCo without fighting. Judging from reader mail, that's the kind of program you like most.

❑

```
2D6BD10BR16U6E14L14U6R24D6G14R14
D6NL24BU10BR6R12U6L12D6BU16BR16R
28D6L10D20L8U20L10U6BR34"
175 DRAW"D26R8U10R10D10R8U26L8D1
0L10U10L8BR32BD26U26R20D6L12D4R1
2D6L12D4R12D6NL20BR6U26R8D20R10D
6NL18BR6U26R8D20R10D6NL18BR6U26R
24D26L24BE6BR2R8U14L8D14"
180 PAINT(4,188),0,0:PAINT(28,17
8),0,0:PAINT(44,188),0,0
185 COLOR1,0:FORI=2TO72STEP4:LIN
E(I,190)-(I,162),PSET:NEXT
190 PAINT(82,178),0,0:PAINT(100,
178),0,0:PAINT(130,178),0,0:PAIN
T(160,178),0,0:PAINT(184,178),0,
0
195 PAINT(206,178),0,0:PAINT(248
,178),0,0
200 CIRCLE(82,67),12,0,.9:CIRCLE
(82,93),12,0,.9
205 CIRCLE(114,67),12,0,.9:CIRCL
E(114,93),12,0,.9
210 LINE(200,0)-(256,58),PRESET,
B
215 LINE(201,1)-(254,57),PRESET,
B
220 DRAW"BM204,4C0D4F4ND4E4U4BR4
D12R8U12NL8BR4D12R8U12BR4ND12R8D
6L8R2F6"
225 DRAW"BM204,42R4ND12R4BR4D12R
8U12BR4ND12R8D6L8R2F6BR4U12M+8,+
12U12"
230 LINE(200,62)-(256,160),PRESE
T,B:LINE(201,63)-(254,159),PRESE
T,B
235 CIRCLE(226,78),12,0,.9:CIRCL
E(226,124),12,0,.9:PAINT(226,124
),0,0
240 PAINT(80,91),0,0:PAINT(112,6
5),0,0
245 BD$="C0BU12L15D24R30U24L15BD
12"
250 BU$="C1BU12L15D24R30U24L15BD
12"
255 CLS:PRINT@32," E-Z-THELLO IS
 A SIMPLIFIED &    QUICK PLAYING
 VERSION OF THE    CLASSIC STRAT
EGY GAME. TWO     PLAYERS ARE N
EEDED. ONE TAKES  WHITE AND THE
 OTHER TAKES THE  BLACK. YOU MU
ST PLACE A PIECE"
260 PRINT" SO IT TRAPS YOUR OPPO
NENT'S     PIECES BETWEEN YOURS.
 THEY WILL THEN SWITCH TO YOUR C
OLOR. IF   YOU CANNOT MAKE A LEG
AL MOVE    PRESS <P> TO PASS ON
THAT TURN.";
265 PRINT" IF NO ONE CAN MAKE A
LEGAL MOVE THEN PRESS <E> TO END
 THE GAME. PRESS <ENTER> TO PLAY
.";
270 X$=INKEY$:IFX$<>CHR$(13)THEN
270
275 CLS0:X=1:Y=1
280 SW=1:CC=2:GOTO290
285 SW=2:CC=1
290 TT=0:CIRCLE(226,29),12,0,.9:
PAINT(226,29),SW,SW:CIRCLE(226,2
9),12,0,.9:GOSUB1010
295 IF BL+WH=36THEN1080
300 C$="BM"+STR$(A(X))+","+STR$(
B(Y))
305 DRAW C$:DRAW BD$
310 A$=INKEY$:SCREEN1,0
315 DRAW BU$:DRAW BD$:DRAW BU$
320 IFA$="P"THEN1000
325 IFA$="E"THEN1080
330 IFA$=""THEN310ELSET=ASC(A$)
335 IFT=8THENX=X-1:IFX<1THENX=1:
GOTO360
340 IFT=9THENX=X+1:IFX>6THENX=6:
GOTO360
345 IFT=94THENY=Y-1:IFY<1THENY=1
:GOTO360
350 IFT=10THENY=Y+1:IFY>6THENY=6
:GOTO360
355 IFT=13THEN365
360 GOTO300
365 IF SQ(X,Y)=0THEN370 ELSE300
370 EX=0
375 IFY=1THEN440
380 FORQ=Y-1TO1STEP-1
385 IFSQ(X,Q)=0THEN405
390 IFSQ(X,Q)=SW THEN410
395 IFSQ(X,Q)=CC THEN EX=1
400 NEXT
405 IF EX=1THEN440
410 IF EX=0THEN440
415 FORK=Y TO Q STEP-1
420 CIRCLE(A(X),B(K)),12,0,.9:PA
INT(A(X),B(K)),SW,SW:CIRCLE(A(X)
,B(K)),12,0,.9
425 TT=1
430 SQ(X,K)=SW
435 NEXT
440 EX=0
445 IFY=6THEN510
450 FORQ=Y+1TO6
455 IFSQ(X,Q)=0THEN475
460 IFSQ(X,Q)=SW THEN480
465 IFSQ(X,Q)=CC THEN EX=1
470 NEXT
475 IF EX=1THEN510
480 IF EX=0THEN510
485 FORK=Y TO Q
490 CIRCLE(A(X),B(K)),12,0,.9:PA
INT(A(X),B(K)),SW,SW:CIRCLE(A(X)
,B(K)),12,0,.9
495 TT=1
500 SQ(X,K)=SW
505 NEXT
510 EX=0
515 IFX=6THEN580
520 FORQ=X+1TO6
525 IFSQ(Q,Y)=0THEN545
530 IFSQ(Q,Y)=SW THEN550
535 IFSQ(Q,Y)=CC THEN EX=1
540 NEXT
545 IF EX=1THEN580
550 IF EX=0THEN580
555 FORK=X TO Q
560 CIRCLE(A(K),B(Y)),12,0,.9:PA
INT(A(K),B(Y)),SW,SW:CIRCLE(A(K)
,B(Y)),12,0,.9
565 TT=1
570 SQ(K,Y)=SW
575 NEXT
580 EX=0
585 IFX=1THEN650
590 FORQ=X-1TO1STEP-1
595 IFSQ(Q,Y)=0THEN615
600 IFSQ(Q,Y)=SW THEN620
605 IFSQ(Q,Y)=CC THEN EX=1
610 NEXT
615 IF EX=1THEN650
620 IF EX=0THEN650
625 FORK=X TO Q STEP-1
630 CIRCLE(A(K),B(Y)),12,0,.9:PA
INT(A(K),B(Y)),SW,SW:CIRCLE(A(K)
,B(Y)),12,0,.9
635 TT=1
640 SQ(K,Y)=SW
645 NEXT
650 PP=0:EX=0
655 IFY=1THEN735
660 FORQ=Y-1TO1STEP-1
665 PP=PP+1:IF X+PP>6THEN735
670 IFSQ(X+PP,Q)=0THEN690
675 IFSQ(X+PP,Q)=SW THEN695
680 IFSQ(X+PP,Q)=CC THEN EX=1
685 NEXT
690 IF EX=1THEN735
695 IF EX=0THEN735
700 PP=-1
705 FORK=Y TO Q STEP-1
```

```
710 PP=PP+1
715 CIRCLE(A(X+PP),B(K)),12,Ø,.9
:PAINT(A(X+PP),B(K)),SW,SW:CIRCL
E(A(X+PP),B(K)),12,Ø,.9
720 TT=1
725 SQ(X+PP,K)=SW
730 NEXT
735 PP=Ø:EX=Ø
740 IFY=1THEN82Ø
745 FORQ=Y-1TO1STEP-1
750 PP=PP-1:IF X+PP<1THEN82Ø
755 IFSQ(X+PP,Q)=ØTHEN775
760 IFSQ(X+PP,Q)=SW THEN78Ø
765 IFSQ(X+PP,Q)=CC THEN EX=1
770 NEXT
775 IF EX=1THEN82Ø
780 IF EX=ØTHEN82Ø
785 PP=1
790 FORK=Y TO Q STEP-1
795 PP=PP-1
800 CIRCLE(A(X+PP),B(K)),12,Ø,.9
:PAINT(A(X+PP),B(K)),SW,SW:CIRCL
E(A(X+PP),B(K)),12,Ø,.9
805 TT=1
810 SQ(X+PP,K)=SW
815 NEXT
820 PP=Ø:EX=Ø
825 IFY=6THEN9Ø5
830 FORQ=Y+1TO6
835 PP=PP+1:IF X+PP>6THEN9Ø5
840 IFSQ(X+PP,Q)=ØTHEN86Ø
845 IFSQ(X+PP,Q)=SW THEN865
850 IFSQ(X+PP,Q)=CC THEN EX=1
855 NEXT
860 IF EX=1THEN9Ø5
865 IF EX=ØTHEN9Ø5
870 PP=-1
875 FORK=Y TO Q
880 PP=PP+1
885 CIRCLE(A(X+PP),B(K)),12,Ø,.9
:PAINT(A(X+PP),B(K)),SW,SW:CIRCL
E(A(X+PP),B(K)),12,Ø,.9
890 TT=1
895 SQ(X+PP,K)=SW
900 NEXT
905 PP=Ø:EX=Ø
910 IFY=6THEN99Ø
915 FORQ=Y+1TO6
920 PP=PP-1:IF X+PP<1THEN99Ø
925 IFSQ(X+PP,Q)=ØTHEN945
930 IFSQ(X+PP,Q)=SW THEN95Ø
935 IFSQ(X+PP,Q)=CC THEN EX=1
940 NEXT
945 IF EX=1THEN99Ø
950 IF EX=ØTHEN99Ø
955 PP=1
960 FORK=Y TO Q
965 PP=PP-1
970 CIRCLE(A(X+PP),B(K)),12,Ø,.9
:PAINT(A(X+PP),B(K)),SW,SW:CIRCL
E(A(X+PP),B(K)),12,Ø,.9
975 TT=1
980 SQ(X+PP,K)=SW
985 NEXT
990 REM END OF ROUTINE
995 IFTT=ØTHEN3ØØ
1000 IFSW=1THEN285ELSEIFSW=2THEN
28Ø
1005 GOTO1005
1010 REM SCORE ROUTINE
1015 BL=Ø:WH=Ø:FORQ=1TO6:FORK=1T
O6
1020 IFSQ(Q,K)=1THEN WH=WH+1
1025 IFSQ(Q,K)=2THEN BL=BL+1
1030 NEXTK,Q
1035 LINE(206,92)-(248,110),PRES
ET,BF
1040 DRAW"BM216,107C1"
1045 Q$=STR$(WH):IF WH>9THEN Q$=
RIGHT$(Q$,2)
1050 FOR Q=1TO2:P$=MID$(Q$,Q,1):
P=VAL(P$):DRAW N$(P):NEXTQ
1055 LINE(206,138)-(248,156),PRE
SET,BF
1060 DRAW"BM216,153C1"
1065 Q$=STR$(BL):IF BL>9THEN Q$=
RIGHT$(Q$,2)
1070 FOR Q=1TO2:P$=MID$(Q$,Q,1):
P=VAL(P$):DRAW N$(P):NEXTQ
1075 RETURN
1080 LINE(200,Ø)-(256,58),PRESET
,BF
1085 IF BL>WH THEN CIRCLE(226,20
),12,1,.9
1090 IF WH>BL THEN CIRCLE(226,20
),12,1,.9:PAINT(226,20),1,1
1095 IF WH=BL THEN 1110
1100 DRAW"BM206,40C1D12R6NU12R6N
U12BR6NU12BR6U12M+8,+12NU12BR4R6
U6L6U6R6"
1105 GOTO1115
1110 DRAW"BM209,24C1R6ND12R6BR6N
D12BR8NR8D6NR8D6R8"
1115 LINE(203,3)-(251,55),PSET,B
1120 X$=INKEY$:IFX$=CHR$(13)THEN
RUNELSE1120
```


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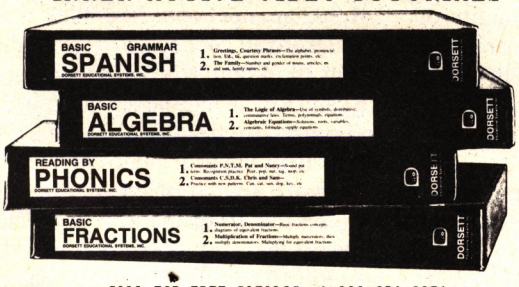

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Bridge the 68000 Gap

by Marty Goodman
Contributing Editor

How can I modify a CoCo 3 to use a 68008 processor? Motorola says that the 68008 uses the same support chips as the 6809. What about rumors of a new computer that is to act as a bridge from the CoCo to the 68000 series of processors?

Norman E. Wagner
Harrisburg, Pennsylvania

I'm sorry but what you want is impossible. Although the 68008 works nicely with the same 68B21 chips used to handle I/O on the CoCo 3, the compatibility ends there. The video and memory circuitry (GIME chip) of the CoCo does not work with a 68008. You would have to design a machine from the ground up to use the 68008. There is no way to just drop it in and make a few minor changes. As I write this, however, it has been two weeks since Frank Hogg Labs and Kenneth Leigh Enterprises introduced new 68000-based machines at RAINBOWfest Chicago. Both of these are OS-9/68K machines and are projected to start selling in August. RAINBOW will be carrying more news of them.

Great Buy

Greg Law, SIGop of the OS-9 SIG on Delphi and Technical Editor for RAINBOW, comments, "I recently had occasion to buy a new GIME chip from National Parts. The new part number for it is MX-0992 and the current price is $21.92, down from $50 a year ago."

Setting the Clock

A while ago my serial-to-parallel converter from Dayton Associates stopped working. I called Dayton and they gave me a simple program to adjust its clock. I set the baud rate to 600 on the converter, then ran this program:

```
10 FOR X=88 TO 80 STEP -1
20 POKE 150,X
30 PRINT #-2,"ABCDEX"
40 NEXT X
```

I was told to adjust a little internal potentiometer until ABCDEX was clearly visible in most of the printouts. I did this and now the converter works again. I am most pleased with the careful help I received from the folks at Dayton.

Dee Friedlander (STREETHEART)
Scotch Plains, New Jersey

That approach also works with Metric Industries converters and probably with the Blue Streak variety as well. These converters use a capacitor and resistor to generate their clock, and the time base occasionally drifts with age, temperature, humidity or vibration, and requires readjustment. The converter I designed for Microcom uses a quartz crystal for its time base and is considerably less likely to drift.

Keyboard Conversion

I recently had occasion to convert an HJL keyboard for use with a CoCo 3. It was surprisingly easy. It takes about 30 seconds to make the one latching function key on the HJL keyboard cease to latch. You just remove a little nylon spring from the latching key, and it becomes a normal non-latching key. The key caps just pull off, so you can exchange F1 and F2 with F3 and F4 to get F1 and F2 properly labelled. You do need to relabel F3 and F4 as CONTROL and ALT after this.

George McCashin (GMCC)
Chattanooga

Composite Negative Sync

I want to hook up a monitor that requires a composite, negative sync to my CoCo. How do I generate a composite negative sync from the separate positive H and V sync the CoCo 3 produces?

Carl J. Boll (CBJ)
Chicago

Feed H and V sync into the two inputs of a single NOR gate on a 74LS02 (quad NOR gate chip). The output of the gate is the composite negative sync of the kind you seek. This works with many Sony, Amiga and other brands of monitors that require composite negative sync with their analog RGB information.

A slick trick is to mount a 74LS02 piggyback on top of the 74LS04 in your CoCo 3. Hook the 74LS02 to the 74LS04 as follows: Pin 7, 11, 12 and 14 of the 74LS02 get soldered to pins 7, 10, 12 and 14 of the 74LS04, respectively. All other pins on the 74LS02 are bent up. Pins 1, 4 and 10 of the 74LS02 are not connected. Pins 2, 3, 5, 6, 8 and 9 are all connected to each other and to Pin 14 of both chips. Then cut resistors R61 and R62 that lie next to the 68B21 chip and run a wire from Pin 13 of the 74LS02 to Pin 10 of the RGB video connector. This provides a source of composite negative sync on Pin 10 of the RGB connector. By clipping those two resistors, you disconnect Pin 10 from the PIA chip — a connection not used by any existing CoCo 3 hardware or software. Now you can use your CoCo 3 with all separate sync monitors (with an appropriate cable) and with monitors that need composite negative sync.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Power Adjustment in Germany

I am moving to Germany in May and would like to know what is involved in making the CoCo, a DMP-132, an FD-502 drive and a Magnavox 8CM515 monitor work on the 220-volt 50Hz power they have there.

Ruben V. Urcuyo
Phoenix

I recommend a 5-amp or greater step down (220- to 110-volt) transformer. Although relatively heavy, it is the best way to go. It brings the voltage to 110 volts. The 50Hz frequency shouldn't be a problem because none of the devices you mentioned derives timing from the line frequency. The only possible problem is that transformers inside the CoCo, printer, drive and monitor could operate less efficiently at the lower line frequency. If the power supply of those devices is marginally constructed, there might be some overheating. You can design circuitry to change the line frequency back to 60Hz, but such circuitry is much more elaborate and expensive than the transformer required to correct the voltage. I don't think it's needed.

FAX ala CoCo?

Is there any way to send and receive FAX messages using a CoCo?

Marvin E. Logan
Ft. Carson, Colorado

Because it is such a low-priced computer, the expensive FAX boards used in other computers have not been devised and offered for the CoCo. I doubt they will be. In 1985, RAINBOW published a program by N6LQV and KB6IRQ that allowed the CoCo to receive Weather FAX without any special hardware other than a couple of LEDs and resistors. I still distribute an updated version of the program and N6LQV's RTTY program as well. But Weather FAX (WEFAX) is quite different from the complex CCITT Group 3 Fax in common use in business today.

Wiring a monitor to CoCo 2

How do I wire a composite video monitor to my CoCo 2?

Stephen Geissinger
Sauk Rapids, Minnesota

While the CoCo 2 was being sold, numerous vendors in RAINBOW offered small circuit boards you clipped or soldered into the CoCo 2 that generated both monochrome and color composite video signals. Designing a circuit to successfully get color composite video out of a CoCo 2 can be

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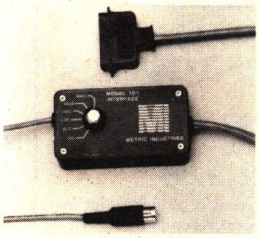

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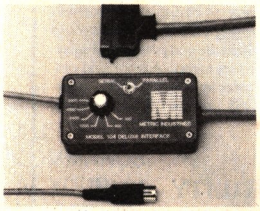
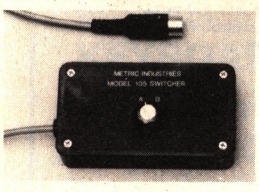
- ★ Comes complete with cables to connect to your printer and computer
- ★ Can be powered by most printers



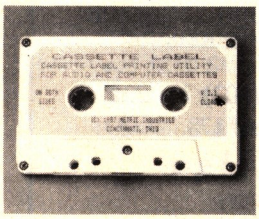
Model 104 Deluxe Interface with "Modem Switch"

- ★ **Same Features as 101 Plus**
- ★ Built in Serial Port for your Modem or other serial device
- ★ Switch between Serial Output and Parallel Output
- ★ Comes with cables to connect to your computer and printer
- ★ Can be powered by most printers



Model 105 Serial Switch

- ★ Connects to your COCO to give you 2 switch selectable Serial Ports
- ★ Comes with a 3 foot cable to connect to your computer
- ★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
- ★ Does not require power



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- ★ Comes on Tape with instructions to transfer to disk
- ★ Menu driven, very easy to use
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- ★ Uses the features of your printer to print standard, expanded, and condensed characters
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- ★ Allows editing of label before printing
- ★ Program comes with 24 labels to get you started
- ★ 16K ECB required

Some of the Printers That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidata, Brother, Juki, and Smith Corona.

Some of the Printers That Cannot –
Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the "P" option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

Write or call for more information or for technical assistance.

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difficult. Getting clean monochrome for an amber, green or black-and-white monitor is easy by comparison.

A circuit for monochrome video involves three common transistors and a few resistors and capacitors used as simple inverting amplifiers and emitter followers. Color-capable video adaptors are no longer on the market. You may check with Howard Medical or Microcom for adaptors still in stock. If you just want composite monochrome video, write to me in care of THE RAINBOW and send me a stamped, self-addressed envelope. I can send you a circuit for such an adaptor. I may even have a few kits left for such monochrome drivers.

Cheap Patch Search

Is there a patch that allows CoCo 2 programs to run on the CoCo 3? I'd like to use CoCo Max II *on the CoCo 3 and prefer to spend no more than $20.*

Andrew Yarrows
East Hampton, Massachusetts

No such patch is available commercially. Various programs have various compatibility problems with the CoCo 3. Microcom sells an RGB patch that fixes many CoCo 2 games that appear in black-and-white on an RGB monitor on a CoCo 3. There have been patches for *CoCo Max II* posted on Delphi. For about $45 you can buy a copy of *CoCo Max 3*, which not only runs on the CoCo 3, but takes full advantage of its greater screen resolution, speed and color capability.

Serial-to-Parallel Converter

Where can I find a serial-to-parallel converter that will allow me to hook my Epson printer to my Color Computer 2?

Ron Hall
Jacksonville, Alabama

Metric Industries sells one such converter. Dayton Associates sells another. Microcom sells yet another. Any one of these allows you to use a printer with a parallel input with the serial output of the Color Computer 1, 2 or 3.

Digital Monitor Blues

How can I get my Magnavox 8CM562 monitor in RGB mode to display all 64 colors when used with a CoCo 3?

Ray McQueen
Eastman, Georgia

You can't without significant internal modification of the monitor because it lacks an analog RGB input. Its existing RGBI digital input allows for display of no more than six colors and black-and-white with the CoCo's RGB signal. With a service manual for that monitor and knowledge of analog video and basic electronics, you could interrupt the R, G and B video lines where they enter the base of the first stage of the video amplifiers for each of the three colors. If you feed the CoCo video in there (through a 10- to 50uf capacitor) you should get a decent analog RGB video and display of all 64 colors.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

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Programming Quick Tips

Everyone has different ideas about programming. And some are just common sense. Here are five things that help me. Maybe they'll help you, too.

• Use a word processor — nothing against the EDIT command, but a full-screen editor dramatically speeds up the debugging process. Lengthy data tables and lists are much easier to type using a word processor. And features such as *global search and replace* make tedious tasks easy. Try changing 200 PRINT#-2 commands to PRINT manually!

• RENUM — if you become confused during editing because of multiple GOTO and GOSUB commands, try using RENUM 1,1,1. Renumbering in this manner quickly exposes any GOTOs and GOSUBs that may be branching to non-existent lines. After cleaning up unresolved lines, use RENUM again to divide the program into clearly numbered sections.

• Use remarks — the smartest programmers make liberal use of the REM statement. Debugging can be a nightmare when you return to work on a program after several months and you can't remember what specific parts are supposed to do. Put *entry* and *exit* conditions in REM lines at the beginning of each subroutine.

• Write in modules — even if you're not using BASIC09, it helps to think of programs in their component sections rather than as one big hunk of code. Write a well-commented subroutine for each function in your program. Save these and use them in other programs. Any job is easier when broken down into its component tasks. And you'll save time on future programs. As a rule, if it's longer than one page, try to break it down.

• Right mental attitude — don't be afraid to write a program. It can be challenging and quite enjoyable. If you think modular, you'll never be working on too much at one time. Remember, the English language has over 100,000 words. BASIC has only about 130, and you need to know only half of them to write excellent programs.

— Ernest F. Zore
Cleveland, Ohio

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Binary Potpourri

by Eddie Kuns
CoCo SIG Database Assistant

General Information (in the OS-9 SIG): **Mike Haaland** (MIKEHAALAND) explains how he put his CoCo system into an IBM AT-type case and powered the system from the PC power supply. **Brian Wright** (POLTERGEIST) uploaded several Star Trek parodies. **Mike Knudsen** (RAGTIMER) released the format of *UltiMusE* scores including suggestions for conversion to and from the *Lyra* file format.

Applications: **Rick Moutoux** (RICKMOU) posted a database program to keep track of information like birthdays and phone numbers. **Phillip Brown** (THEFERRET) sent us a pop-up calculator.

Utilities: **Chuck Owens** (CZO) uploaded a utility to select fonts for the Star SG-10 printer. **Will Wright** (WILLWRIGHT) submitted a set of utility demos from r3 Systems to help you set up a point-n-click menuing environment. **Ken Lindsay** (KLINDSAY) contributed a replacement for Microware's `copy` command, which can copy multiple files. **Jim McDowell** (JMLSOFT) posted a program that generates a shell script to copy an entire DECB formatted disk to an OS-9 formatted disk using Bob Santy's *RS-DOS* utility. **Roger Krupski** (HARDWAREHACK) uploaded the newest version of `dEd` (a disk editor/zapper), a filter to translate ASCII text to audio Morse code, and a utility to toggle OS-9's automatic CRC checking. **Kevin Leger** (KEVINLEGER) contributed a cross between `echo` and `list`. **Bruce Isted** (BRUCEISTED) uploaded *MegaRead*, which reads one megabyte from standard input, which is useful for benchmarking hard drive systems. Brian Wright ported several utilities from UNIX to OS-9. **Donald Thrash** (DONTHRASH) submitted a program that allows you to print on both sides of your printer paper. **Cliff Redding** (CLIFFORD) contributed a `PRINT@` utility for BASIC09 users. **Tim Koonce** (TIMKOONCE) released the latest version of the *CUTS* encoder/decoder. Tim also posted a file describing the Color Computer mailing list on InterNet and BitNet. **Bill Turbett** (WBT) uploaded a filter to remove extra carriage returns from a text file. **Guy Loucks** (GUYLOUCKS) released *TSUtil*, a utility package he wrote with Bruce Isted.

Telcommunications: Ken Lindsay ported the `WizAcia` driver so it will work with the Eliminator. **Brad Neuberg** (FIDGET) submitted *Chomp*, a game that supports ANSI and OS-9 screen escape sequences.

Graphics & Music: Mike Haaland released *IMGShow* Version 1.1 to display IMG pictures. **Jason Forbes** (COCO3KID) gave us *GLife* Version 2.0, an implementation of the popular Life simulation. **Bert Schneider** (OS9BERT) uploaded "Flight of the Bumble Bee" for *UltiMusE*.

Programmers Den: **Mike Shook** (MISHOO) helps us call the National Bureau of Standards to set our clocks to NTC.

68K-OS9: **Daniel Boulanger** (SMARTCOCO) submitted *ATerm* Version 2.6, an OS9/68000 terminal program written in 68000 assembly language.

Tutorials & Education: **Mike Stute** (GRIDBUG) released *Hitchiker's Guide to C*, a 10-chapter book designed to teach the C programming language.

CoCo SIG:

General Information: If you're having trouble uploading to the CoCo SIG databases, then you'll want to read some of the help files posted by **Don Hutchison** (DONHUTCHISON), which include example submission sessions.

CoCo 3 Graphics: This starts off with a bundle of adult pictures in the IMG format from **Richard Trasborg** (TRAS), some in 16-level gray scale and others in 4096 colors. **Kader** (KADER) uploaded a digitized picture by Nagel. **Pete Ellison** (PETEELLISON) submitted an IMG picture of the Duke. **Tommie Taylor** (TOMMIETAYLOR) contributed a CGP-200 printer screen-dump program and a BASIC graphics editor.

Utilities and Applications: **Randy Cassel** (BBTROLL) posted a program to help you keep softball statistics. **Eric Parish** (ERICPAR) submitted a program for planetary orbits.

Hardware Hacking: **Marty Goodman** (MARTYGOODMAN) uploaded two dissertations this month, the first explaining how the Multi-Pak works and comparing the Howard Medical Slot Pak II to it. The second one explains how the 64K and 128K banked ROM packs function.

Music & Sound: **Rob Heil** (ROBHEIL) contributed several Yes songs, including "Cord," "Eclipse" and "Apocalypse."

Product Reviews & Announcements: Marty Goodman posted a product review of the Howard Medical Slot Pak II, a Multi-Pak Interface replacement.

Telecommunications: Dennis Gray (DENNISGRAY) uploaded a program to autoboot *Autoterm*.

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.

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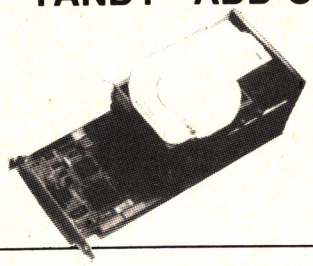

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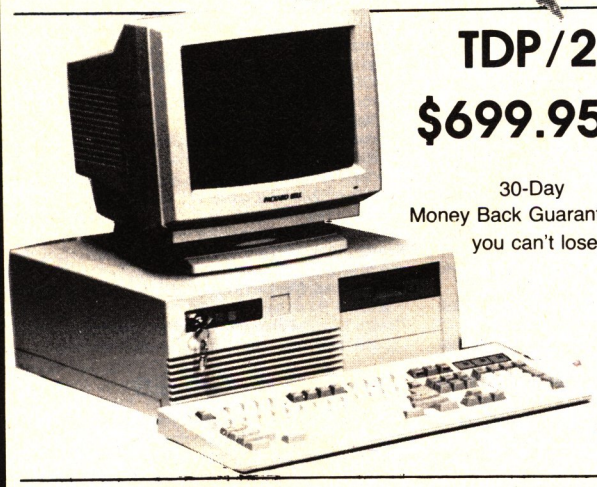

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The Ninth Year of Rainbow

An index to the articles, programs, reviews and authors appearing in THE RAINBOW from July 1989 through June 1990.

Compiled by Kelly Goff

This is the seventh index to THE RAINBOW. Previous indices appear each July starting with the July 1984 issue. The breakdown of articles appearing over the past year is shown below:

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Complete your library! For more information on how to get back issues with your favorite programs and articles, refer to Page 42 of this issue of THE RAINBOW.

BUSINESS

Brunotte, Benjamin. "Another Form"; CoCo3; April 1990, p.64. Create custom forms. FORMAKER.
Fouts, Gordon E. "The Price is Right"; CoCo3; April 1990, p.116. An aid for finding mark-up/down percentages. MARKUP.
Macias, David. "Predicting Profits"; CoCo3; April 1990, p.44. Perform break-even analysis. COST.PAS.
Messer, Shane. "The Golden Retriever"; CoCo3; April 1990, p.24. Roll your own database program. COLRBASE.
Stephens, Bryan. "Show the Facts"; CoCo3; April 1990, p.67. 3-D bar-graph program. 3DGRAPH.
Stuart, John. "The Total Figure"; CoCo1/CoCo2/CoCo3; February 1990, p.26. A full-featured spreadsheet. COCOCALC.

COMMUNICATIONS

Ford, Steven. "CoCo and Amateur Radio"; November 1989, p.44. Discussion of ham radio as a hobby.
Ford, Steven. "Plug Into Packet"; February 1990, p.22. Exploration of packet radio.
Hutchison, Don. "Delphi Bureau"; July 1989, p.87. GameTerm and other shareware terminal programs.
Hutchison, Don. "Delphi Bureau"; September 1989, p.42. "New Horizons".
Hutchison, Don. "Delphi Bureau"; October 1989, p.54. "Tokenized BASIC".
Hutchison, Don. "Delphi Bureau"; November 1989, p.36. "KEYSUB and WEFAX and Guide - Oh, My!".
Hutchison, Don. "Delphi Bureau"; December 1989, p.35. "The World's First".
Koonce, Tim. "Observing the Social Graces"; November 1989, p.72. Introduction to file-transfer protocols.
Kuns, Eddie. "Database Report"; April 1990, p.62. "Name That Tune With UltiMusE".
Kuns, Eddie. "Database Report"; June 1990, p.92. "OS-9 Uploads Growing".
Law, Greg. "Database Report"; March 1990, p.72. "New Uploads".
Onley, Ray. "An Old Code in a New Mode"; CoCo1/CoCo2/CoCo3; November 1989, p.12. Morse code training program for CoCo. CODEMSTR.

EDITORIAL COMMENT

Augsburg, Cray. "Wrapping The Rainbow"; October 1989, p.14. "An Electronic Evolution".
Augsburg, Cray. "Wrapping The Rainbow"; November 1989, p.123. "Join the Chorus!".
Augsburg, Cray. "Wrapping The Rainbow"; December 1989, p.124. "OS-9: Room for Growth".
Augsburg, Cray. "Wrapping The Rainbow"; January 1990, p.124. "From Reader to Writer".
Augsburg, Cray. "Wrapping The Rainbow"; February 1990, p.10. "The Show Must Go On".
Augsburg, Cray. "Wrapping The Rainbow"; March 1990, p.124. "What's in Store?".
Augsburg, Cray. "Wrapping The Rainbow"; April 1990, p.124. "How Many Colors in a Rainbow?".
Augsburg, Cray. "Wrapping The Rainbow"; May 1990, p.124. "Rainbow Illusions".
Falk, Lonnie. "Print#-2"; July 1989, p.12. "Fun at the 'Fest".
Falk, Lonnie. "Print#-2"; August 1989, p.10. "Eight Years Strong".
Falk, Lonnie. "Print#-2"; September 1989, p.10. "A New Site for RAINBOWfest".
Falk, Lonnie. "Print#-2"; October 1989, p.10. "A Transition at The Rainbow".
Falk, Lonnie. "Print#-2"; November 1989, p.10. "Spread the Word!".
Falk, Lonnie. "Print#-2"; December 1989, p.10. "Canadian Future II".
Falk, Lonnie. "Print#-2"; January 1990, p.10. "History in the Making".
Falk, Lonnie. "Print#-2"; March 1990, p.10. "New Life for CoCo".
Falk, Lonnie. "Print#-2"; April 1990, p.10. "A Helping Hand".
Falk, Lonnie. "Print#-2"; May 1990, p.10. "Spring Forward, Look Back".

EDUCATION

Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; August 1989, p.64. "Building Reading Skills". FOLLOW.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; September 1989, p.54. "Learning About Ratios". RATIOS.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; October 1989, p.52. "Cracking Codes". CODEWORD.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; November 1989, p.24. "Probability". PROBABLE.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; December 1989, p.32. "To Rhyme or Not to Rhyme". POETRY.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; February 1990, p.94. "One-On-One Math Drills". BASKET.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; March 1990, p.112. "Toronto, Ontario for a Basket". BASKETBL.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; April 1990, p.85. "a,e,i,o,u". VOWELS.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; May 1990, p.88. "Cooking With Metric Measures". METRIC.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; June 1990, p.18. "Integers in Order". CONSEC.
Collicott, John. "Bookworm"; CoCo1/CoCo2/CoCo3; September 1989, p.32. Helps develop problem-solving skills in math. BOOKWORM.
Crooks, Mary. "Time Test"; CoCo1/CoCo2/CoCo3; August 1989, p.56. Timed drills in multiplication and division. TIMETEST.
Falge, Linda. "KinderFun"; CoCo1/CoCo2/CoCo3; September 1989, p.84. Children's program to learn colors, letters, numbers, music. KINDRFUN.
Giles, Douglas. "Super Quiz"; CoCo1/CoCo2/CoCo3; October 1989, p.40. Helps develop memorization skills. SUPRQUIZ.
Johnson, Samuel. "EduSpell, Part II:The Dictionary"; CoCo1/CoCo2/CoCo3; July 1989, p.50. Part II in the development of a talking spelling tutor. MAINMENU.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; July 1989, p.91. "Getting the Whole Picture on Fractions". FRACTION.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; September 1989, p.66. "CoCo Teaches Kids to Just Say No". NODRUGS.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; December 1989, p.60. "Learning Letters". UPLOCASE.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; January 1990, p.42. "Learn to Give and Take". DRILLER3.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; February 1990, p.62. "Music Class 101". MUSIC101.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; March 1990, p.12. "Right on Time". WATCH.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; April 1990, p.118. "It Strikes a Chord". MUSIC102.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; May 1990, p.36. "A Real Clef Hanger". MUSIC103.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; June 1990, p.22. "Learning Letter Sequence". BETWEEN.

GAMES

Bradbury, Nick. "Icarus in Search of Wings"; CoCo3; April 1990, p.12. Do an arcade penguin dance. PENGUIN.
Bradbury, Nick. "One Tile at a Time"; CoCo3; January 1990, p.72. Fast action tile game. FRUSTRAT.
Britton, Steve. "Samurai"; CoCo1/CoCo2/CoCo3; March 1990, p.114. Oriental battle-type game. SAMURAI.
Campbell, Marc. "The Checkers Champ"; CoCo3; November 1989, p.82. Computerized checker game.. CHECKERS.
Coty, Curt. "Shopping Spree"; CoCo3; July 1989, p.34. Action game - player goes shopping in a department store. SPREE.
Cuadra, Hector. "What Goes Up . . ."; CoCo1/CoCo2/CoCo3; January 1990, p.112. Physics game. GRAVITY.
George, Thomas. "The Tholean Web"; CoCo1/CoCo2/CoCo3; July 1989, p.42. Maze game where player must neutralize a force field. WEBBAS.
Hegberg, Joel. "A Mazing Adventure"; CoCo1/CoCo2/CoCo3; December 1989, p.46. Maze Adventure, quest for evil dragon. THEQUEST.
Messer, Shane. "CoCo Jumble"; CoCo1/CoCo2/CoCo3; June 1990, p.50. A scrambled-word game for two players. JUMBLE2.
Mosley, John. "Vegas at Your Fingertips"; CoCo3; June 1990, p.12. A slot machine for the CoCo 3. SLOTS.
Ostrom, Steve. "A Newfangled Maze"; CoCo1/CoCo2/CoCo3; February 1990, p.50. A maze that uses numbers for directional clues. MAZEWAY.
Quellhorst, George. "Peg Me!"; CoCo3; December 1989, p.26. CoCo version of Hi-Q. COCO-Q.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; October 1989, p.48. "Meteor Storm 3". METEOR3.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; November 1989, p.54. Machine Language Tricks from a BASIC Game: Star Siege II. SIEGE2.
Veal, Evan. "The Black Box"; CoCo1/CoCo2/CoCo3; August 1989, p.26. Computer hides five balls in a box and you must find them. BLACKBOX.
Webb, Mark. "The Guessing Game"; CoCo3; May 1990, p.50. A one-player game of choosing colors. MINDSTIM.
Wolf, Eric. "Where's the Matching Box?"; CoCo3; February 1990, p.88. A two-player game of concentration. CCTRATE.
Wolf, Eric. "Worm Invaders from Space"; CoCo3; March 1990, p.18. An arcade-action game. WORMINVD.

GENERAL

Foster, Leslie. "The Eighth Year of Rainbow"; July 1989, p.147. Index - July 1988 to June1989.
Goodeil, Kirk. "Patchwork on the CoCo 3"; CoCo3; November 1989, p.26. Patch disk programs. BLASTER.
Murphy, Stephen. "The Price of Wisdom"; February 1990, p.14. A humorous admonishment to use your manual.
Parker, Jeffrey. "RAINBOWfest Reporter"; September 1989, p.73. Chicago 1989 'fest report..
Parker, Jeffrey. "RAINBOWfest Reporter"; March 1990, p.34. Somerset 1989 'fest report.
Ries, Richard. "Printing the Unprintable"; CoCo1/CoCo2/CoCo3; December 1989, p.121. A filter program for odd characters. READ.B.
Staff. "Anniversary Special: One-Liner Insert"; CoCo1/CoCo2/CoCo3; July 1989, p.131. A collection of one-liners.
Staff. "Did You Hear the One About Hints & Tips?"; January 1990,

p.60. Hints, tips and one-liners.
Staff. "Reader Survey"; November 1989, p.124. General survey of CoCo readers' use and opinions..
Staff. "The Heat is On!"; July 1989, p.26. A midyear buyers guide to new games and game hardware.

GRAPHICS

Barden, William. "Barden's Buffer"; November 1989, p.64. "Put on Your 3-D Glasses".
Bennett, Jim. "Tricky Graphics"; CoCo3; October 1989, p.20. Neat trick for programming graphics on CoCo 3.. CARRIER.
Bernico, Bill. "The CoCo Coloring Book"; CoCo3; September 1989, p.12. Coloring pictures with the computer. COLRBOOK.
Curtis, Allen. "High-Capacity Screen Dumps"; CoCo3; August 1989, p.38. High-density printer enhancements for desktop publisher. DRIVERHT.
Curtis, Allen. "High-Capacity Screen Dumps"; CoCo3; October 1989, p.63. How to save and load a half-screen. DHPATCH.
Golias, Ruth. "He's Just a Snowman"; CoCo3; December 1989, p.20. Sing along with Frosty. FROSTY.
Grant, Ron. "The Schematic Scoundrel, Revisited"; CoCo1/CoCo2/CoCo3; July 1989, p.101. Adding symbol rotation for more flexibility. COCOCAD.
Messer, Shane. "Improving the Scheme of Screens"; CoCo3; January 1990, p.82. Create icons for your programs. DESIGNER.
Mosely,John. "Winter Magic"; CoCo3; December 1989, p.12. A program for producing snow onscreen. SNOW.
Nee, William. "The Graphics Corner"; CoCo1/CoCo2/CoCo3; August 1989, p.36. Three ways to create color graphics on the CoCo. CLRDEMO.
Nee, William. "The Graphics Corner, Part II"; CoCo1/CoCo2/CoCo3; September 1989, p.48. PSETing numbers without using coordinates. SCRLDEMO.
Nee, William. "The Graphics Corner, Part III"; CoCo1/CoCo2/CoCo3; October 1989, p.78. A two-dimensional array that helps generate new values. NEIGHBR1.
Ostrom, Steve. "A Perfect Star"; CoCo1/CoCo2/CoCo3; March 1990, p.92. Lesson in trigonometry and CoCo graphics. TRIG1.
Spiller, Jeremy & Spiller, Marty. "The Mandelbrot Bug and CoCo 3 Microscope"; CoCo3; January 1990, p.76. A geometric look at chaos. MANDEL.
Stanwood, Ron. "Color Your CoCo World"; CoCo3; July 1989, p.66. Utility to transfer PMODE 3 & 4 screens to CoCo 3 HSCREENs. MULTIRES.
Tinklepaugh, Dale. "Draw it Quick!"; CoCo1/CoCo2/CoCo3; August 1989, p.24. Draws in High-Res, creates file of BASIC Statements. QUIKDRAW.
Vandall, Michael. "Graphics in a Hurry"; CoCo3; October 1989, p.26. Converts artwork on graphics screen into BASIC code. GRAPHPRO.

HARDWARE

Barden, William. "Barden's Buffer"; September 1989, p.102. "Loose Ends and CoCo Outputs".
Barden, William. "Barden's Buffer"; CoCo3; February 1990, p.42. "High Hopes for the Hi-Res". READHI.
Barden, William. "Barden's Buffer"; CoCo3; March 1990, p.40. "A CoCo Dual-Trace Oscilloscope". SCOPE.
Bodnar, David. "Exposing the CoCo to Photography"; CoCo1/CoCo2/CoCo3; February 1990, p.96. Use the CoCo for timing applications in the darkroom. DARKROOM.
Brunotte, Benjamin. "Custom Built Desk for the CoCo"; December 1989, p.67. A real nail and hammer project.
Distefano, Tony. "Turn of the Screw"; July 1989, p.98. "Dynamic Random Access Memory Explained".
Distefano, Tony. "Turn of the Screw"; September 1989, p.56. "Building a RAM Disk".
Distefano, Tony. "Turn of the Screw"; October 1989, p.86. "Building a RAM Disk".
Distefano, Tony. "Turn of the Screw"; CoCo1/CoCo2/CoCo3; December 1989, p.64. "RAM Disk, Part III". GENTEST.
Distefano, Tony. "Turn of the Screw"; January 1990, p.40. "Disk Track Tracer".
Distefano, Tony. "Turn of the Screw"; February 1990, p.18. "A Digital Lesson".
Distefano, Tony. "Turn of the Screw"; March 1990, p.56. "A Digital Lesson, Part 2".
Distefano, Tony. "Turn of the Screw"; April 1990, p.110. "Digital Lesson, Part 3".
Distefano, Tony. "Turn of the Screw"; May 1990, p.54. "Tools of the Trade".
Distefano, Tony. "Turn of the Screw"; June 1990, p.80. "Clearing the Paths".
Francisco, Harleen. "The Economy Printer Buffer, Part II"; July 1989, p.72. Build and troubleshoot the printer buffer.
Goodman, Marty. "Adding a Disk Drive to Your CoCo Pt. 2"; April 1990, p.92. Adding disk drives to the CoCo.
Goodman, Marty. "Disk Drives and the Color Computer"; March 1990, p.22. Adding a floppy disk to the CoCo.
Goodman, Marty. "The OS-9 *CART Interrupt Fix"; CoCo3; November 1989, p.50. Multi-Pak and CoCo 3 fixes.
Iacovou, Neophytos. "A Special Switch"; May 1990, p.43. Four projects using the 4PDT switch.
Weide, Dennis. "A CoCo Digital Logic Analyzer, Part 1"; CoCo1/CoCo2/CoCo3; March 1990, p.26. Hardware project for circuit construction and debugging. TESTIF.
Weide, Dennis. "Completing the Analyzer Project"; CoCo1/CoCo2/CoCo3; April 1990, p.72. Tool for testing low-speed logic circuits. ANALYZER.

HOME APPLICATIONS

Francis, David. "Moon Mapper"; CoCo3; March 1990, p.82. Helps you track the planet-size moons of Jupiter. GALISAT3.
Hinton, Ron. "Best Medicine for Disorderly Med. Bills"; CoCo3; February 1990, p.116. Keep the financial side of your medical history in order. MEDIC3.
Kenny, Keiran. "Booklet, Revisited"; CoCo1/CoCo2/CoCo3; May 1990, p.40. Mods to allow for bigger booklets. PATBOOK.
LeBlanc, Dave. "Personal Secretary"; CoCo1/CoCo2/CoCo3; December 1989, p.56. A personalized notepad for easy organization. COCOMEMO.
Macias, David. "Mapping Your Finances"; CoCo3; November 1989, p.20. Calculates annual interest rates in percentage form, etc. AMORTIZE.
Minze, Bill. "Reckoning With the CoCo"; CoCo1/CoCo2/CoCo3; April 1990, p.20. Printing calculator program. CALCULAT.
Reichert, Kevin. "Captivating Captions"; CoCo3; November 1989, p.58. Makes labels for photos. CAPTION.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; August 1989, p.104. "More Time Applications". REALTIME.
Shaulis, Jerry. "Bank & Budget"; CoCo1/CoCo2/CoCo3; February 1990, p.74. Helps maintain your checkbook. CHECK1.
Thomas, Scott. "Innovation Along the Border"; CoCo1/CoCo2/CoCo3; January 1990, p.106. Creates border along stationery. STATION.
Turner, Robert Allen. "CoCo Typer"; CoCo1/CoCo2/CoCo3; May 1990, p.58. Turn CoCo into a typewriter for those short notes. COLRTYPE.
Wulfsberg, Bruce. "From Fractures to Fractions"; CoCo1/CoCo2/CoCo3; February 1990, p.12. Program that reduces fractions to their lowest form. FRACTION.

MUSIC

Bernico, Bill. "Guitar 3"; CoCo3; February 1990, p.112. Displays guitar chords on the CoCo 3 graphics screen. GUITAR3.
Budenholzer, William. "Nickelodeon"; CoCo1/CoCo2/CoCo3; August 1989, p.84. Song editor/player. NICKEL-D.
Parker, Jeffrey. "Play It Again, CoCo"; December 1989, p.74. A close look at MIDI.

NOVICES NICHE

Aftamonow, Ellen. "Tax and Tip"; CoCo1/CoCo2/CoCo3; July 1989, p.105. Helps you divvy up restaurant bills. TAXTIP.
Arko, Lyn. "Doggone"; CoCo1/CoCo2/CoCo3; July 1989, p.108. Draws a graphics image of a dog. DOGGONE.
Babich, Tio. "Draw Figures Using Asterisks"; CoCo1/CoCo2/CoCo3; November 1989, p.39. Draw figures using asterisks. FIGDRW.
Babich, Tio. "Slope and Funnel"; CoCo3; July 1989, p.108. Draws a slope and funnel on the CoCo 3 640x192 screen. SLOPEFNL.
Benny, Patrick. "On The Run"; CoCo1/CoCo2/CoCo3; July 1989, p.106. Create smooth animation sequences. LION.
Bernico, Bill. "Box Menu"; CoCo1/CoCo2/CoCo3; January 1990, p.32. Spices up menu screen and makes item selection interesting. BOXMENU.
Bernico, Bill. "Songwriter's Helper"; CoCo3; September 1989, p.60. Plays various musical patterns. SONGRITR.
Bernico, Bill. "Sound-to-Play"; CoCo1/CoCo2/CoCo3; August 1989, p.110. Matches up PLAY command note values for SOUND command. PLAYCONV.
Bernico, Bill. "This Is Your Big Debut"; CoCo3; February 1990, p.35. Title screen with moving lights. MARQUEE3.
Boughton, Ralph. "Star Defender"; CoCo3; September 1989, p.61. Shoot down enemy ships before your bases are hit. STARDEF.
Cheves, Warren. "Car Bingo Game"; CoCo1/CoCo2/CoCo3; November 1989, p.42. Prints index cards with two-character state abbreviations. BINGO.
Christensen, Glenn. "Attributes"; CoCo3; March 1990, p.60. Adds color to your screen. ATTR.
Darren Day. "The Change Counter"; CoCo1/CoCo2/CoCo3; September 1989, p.64. Counts change. Enter Q for quarter, D for dime, etc. CHANGE.
Driessen, David. "Want a Personalized Phone Number?"; CoCo1/CoCo2/CoCo3; August 1989, p.108. Takes phone number and spells out all letter combinations. FONEFIND.
Driscoll, Chris. "Escape"; CoCo1/CoCo2/CoCo3; February 1990, p.37. Try to escape from this twenty-level castle. ESCAPE.
Ehrenberg, R.M. "Categories"; CoCo1/CoCo2/CoCo3; March 1990, p.62. An alternative to Trivial Pursuit or Monopoly. CATS.
Flinn, William. "Solving Quadratic Equations"; CoCo1/CoCo2/CoCo3; June 1990, p.49. Help in finding roots of quadratic equations. QUADRATC.
Forster, Jim. "Moonscape"; CoCo3; January 1990, p.32. Forms moon in sky. MOON.
Friedrich, John. "Story Writer"; CoCo1/CoCo2/CoCo3; July 1989, p.104. A game that challenges writing creativity. STORYWRT.
Friesen, Geoff. "Superpoke"; CoCo3; June 1990, p.48. Allows multiple-byte pokes. SUPRPOKE.
Garcia, Carlos. "Searching for a Rainbow"; CoCo3; January 1990, p.36. Animates a rainbow and waterfall. RAINBOW.
Hall, Greg. "Let CoCo Calculate HBUFF"; CoCo3; February 1990, p.36. A fast simple way to calculate HBUFF. HBUFF.
Haveman, Evan. "Computer Aided Design"; CoCo3; October 1989, p.59. Demonstrates computer aided design at minimal level. MINICAD.
Hobson, Jon. "Marynote"; CoCo1/CoCo2/CoCo3; October 1989, p.58. Plays songs and displays notes one at a time. MARYNOTE.
Jacob, David. "Let's Make a List"; CoCo3; February 1990, p.38. Create a database for your books. LISTER.
Jones, Leroy. "Innkeeper"; CoCo1/CoCo2/CoCo3; March 1990, p.62. Catch falling drinks with trays. INNKEEP.
Kastack, Rebecca. "What Day?"; CoCo1/CoCo2/CoCo3; January 1990, p.30. Calendar for finding day of week of birthdays. WHATDAY.
Kenny, Keiran. "What Is on the Agenda for Today?"; CoCo1/CoCo2/CoCo3; April 1990, p.49. Home help, scratchpad. AGENDA.
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Medlock, William. "Disk Copy Utility"; CoCo1/CoCo2/CoCo3; January 1990, p.31. Copies files from one disk to another. COPY.
Mills, Robert. "Letters & Numbers"; CoCo3; June 1990, p.48. Helps youngsters learn to recognize letters and numbers. LETRSNUM.
Mosley, John. "3-D Grapher"; CoCo3; August 1989, p.107. Graphics using three-variable equations. GRAPH.
Mosley, John. "Kaleidoscope"; CoCo3; September 1989, p.63. Computer display of multicolor symmetric patterns. SCOPE.
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Pendall, Joseph. "And Along Came a Spider"; CoCo3; April 1990, p.48. Graphics program. SPIDERS.
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Pollock, Grahame. "Up-Down LIST"; CoCo1/CoCo2/CoCo3; July 1989, p.106. Utility to allow scrolling through LLISTings. UPDNLIST.
Porter, John. "Mortgage"; CoCo1/CoCo2/CoCo3; March 1990, p.63. Mortgage calculation program. MORTGAGE.
Pucella, Ric. "Hi-Res Graphics"; CoCo3; November 1989, p.41. Utility to save HSCREENs. HRGCOM.
Rodriguez, Alejandro. "No Smoking!"; CoCo3; November 1989, p.40. Graphics animation of No Smoking sign. NOSMOKE.
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Rumpel, Kathy. "Steady Aim Fire"; CoCo3; April 1990, p.50. Shoot-em-up game. BIRD.
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Severs, Roger. "Keeping a Tab on Your Tap"; CoCo1/CoCo2/CoCo3; April 1990, p.48. Figuring water bills. WATER.
Speight, Kevin. "Mind Master"; CoCo3; September 1989, p.62. Selects a four-digit code for you to break. MINDMSTR.
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Thompson, Ernie. "Now, Where Was I?"; CoCo1/CoCo2/CoCo3; August 1989, p.108. Prints format to keep track of programs, articles, comments. RBOWLIST.
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Wong, Thomas. "Bowling"; CoCo3; July 1989, p.103. A CoCo 3 bowling game.. BOWLING.
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Calling OS-9's SS.Tone system call from BASIC09. SOUND.
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Deneen, Kevin. "One Label or Two?"; CoCo1/CoCo2/CoCo3; January 1990, p.110. Makes labels in groups of one or more. LABEL.C.
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Britton, Steve. "Samurai"; CoCo1/CoCo2/CoCo3; March 1990, p.114. Oriental battle-type game. SAMURAI.
Brumley, Troy. "Text File Compression"; CoCo1/CoCo2/CoCo3; September 1989, p.112. Programs to compress text files for more storage space. COMPRESS.
Brunotte, Benjamin. "Another Form"; CoCo3; April 1990, p.64. Create custom forms. FORMAKER.
Brunotte, Benjamin. "Custom Built Desk for the CoCo"; December 1989, p.67. A real nail and hammer project.
Budenholzer, William. "Nickelodeon"; CoCo1/CoCo2/CoCo3; August 1989, p.84. Song editor/player. NICKEL-D.
Campbell, Marc. "The Checkers Champ"; CoCo3; November 1989, p.82. Computerized checker game.. CHECKERS.
Campbell, Marc. "The Invincible Duplicator"; CoCo1/CoCo2/CoCo3; September 1989, p.44. Makes BASIC programs virtually crashproof. DUPLICAT.
Cheek, Joseph. "Reach Out and Touch OS-9"; CoCo3; October 1989, p.72. A utility for updating files. TOUCH.
Cheves, Warren. "Car Bingo Game"; CoCo1/CoCo2/CoCo3; November 1989, p.42. Prints index cards with two-character state abbreviations. BINGO.
Christensen, Glenn. "Attributes"; CoCo3; March 1990, p.60. Adds color to your screen. ATTR.
Collicott, John. "Bookworm"; CoCo1/CoCo2/CoCo3; September 1989, p.32. Helps develop problem-solving skills in math. BOOKWORM.
Coty, Curt. "Shopping Spree"; CoCo3; July 1989, p.34. Action game - player goes shopping in a department store. SPREE.
Crooks, Mary. "Time Test"; CoCo1/CoCo2/CoCo3; August 1989, p.56. Timed drills in multiplication and division. TIMETEST.
Cuadra, Hector. "What Goes Up . . ."; CoCo1/CoCo2/CoCo3; January 1990, p.112. Physics game. GRAVITY.
Curtis, Allen. "High-Capacity Screen Dumps"; CoCo3; August 1989, p.38. High-density printer enhancements for desktop publisher. DRIVERHT.
Curtis, Allen. "High-Capacity Screen Dumps"; CoCo3; October 1989, p.63. How to save and load a half-screen. DHPATCH.
Dalene, Mike. "Harness Those Keys"; CoCo1/CoCo2/CoCo3; January 1990, p.26. Redefine the "control" keys for your own specific needs. KEYEDIT.
Daniels, Bill. "Back From the Dead"; CoCo1/CoCo2/CoCo3; June 1990, p.26. Resurrecting killed disk files. DISKEDT.
Darren Day. "The Change Counter"; CoCo1/CoCo2/CoCo3; September 1989, p.64. Counts change. Enter Q for quarter, D for dime, etc. CHANGE.
Deneen, Kevin. "One Label or Two?"; CoCo1/CoCo2/CoCo3; January 1990, p.110. Makes labels in groups of one or more. LABEL.C.
Distefano, Tony. "Turn of the Screw"; July 1989, p.98. "Dynamic Random Access Memory Explained".
Distefano, Tony. "Turn of the Screw"; September 1989, p.56. "Building a RAM Disk".
Distefano, Tony. "Turn of the Screw"; October 1989, p.86. "Building a RAM Disk".
Distefano, Tony. "Turn of the Screw"; CoCo1/CoCo2/CoCo3; December 1989, p.64. "RAM Disk, Part III". GENTEST.
Distefano, Tony. "Turn of the Screw"; January 1990, p.40. "Disk Track Tracer".
Distefano, Tony. "Turn of the Screw"; February 1990, p.18. "A Digital Lesson".
Distefano, Tony. "Turn of the Screw"; March 1990, p.56. "A Digital Lesson, Part 2".
Distefano, Tony. "Turn of the Screw"; April 1990, p.110. "Digital Lesson, Part 3".
Distefano, Tony. "Turn of the Screw"; May 1990, p.54. "Tools of the Trade".
Distefano, Tony. "Turn of the Screw"; June 1990, p.80. "Clearing the Paths".
Driessen, David. "Want a Personalized Phone Number?"; CoCo1/CoCo2/CoCo3; August 1989, p.108. Takes phone number and spells out all letter combinations. FONEFIND.
Driscoll, Chris. "Escape"; CoCo1/CoCo2/CoCo3; February 1990, p.37. Try to escape from this twenty-level castle. ESCAPE.
Ehrenberg, R.M. "Categories"; CoCo1/CoCo2/CoCo3; March 1990, p.62. An alternative to Trivial Pursuit or Monopoly. CATS.
Esposito, Richard. "Doctor ASCII"; November 1989, p.34.
Esposito, Richard & Libra, Richard. "Doctor ASCII"; July 1989, p.124. Technical potpourri.
Estrado, Richard. "The File Handler"; CoCo1/CoCo2/CoCo3; April 1990, p.106. Copy routine that uses wildcards. COPYASM.
Falge, Linda. "KinderFun"; CoCo1/CoCo2/CoCo3; September 1989, p.84. Children's program to learn colors, letters, numbers, music. KINDRFUN.
Falk, Lonnie. "Print#-2"; July 1989, p.12. "Fun at the 'Fest".
Falk, Lonnie. "Print#-2"; August 1989, p.10. "Eight Years Strong".
Falk, Lonnie. "Print#-2"; September 1989, p.10. "A New Site for RAINBOWfest".
Falk, Lonnie. "Print#-2"; October 1989, p.10. "A Transition at The Rainbow".
Falk, Lonnie. "Print#-2"; November 1989, p.10. "Spread the Word!".
Falk, Lonnie. "Print#-2"; December 1989, p.10. "Canadian Future II".
Falk, Lonnie. "Print#-2"; January 1990, p.10. "History in the Making".
Falk, Lonnie. "Print#-2"; March 1990, p.10. "New Life for CoCo".
Falk, Lonnie. "Print#-2"; April 1990, p.10. "A Helping Hand".
Falk, Lonnie. "Print#-2"; May 1990, p.10. "Spring Forward, Look Back".
Flinn, William. "Solving Quadratic Equations"; CoCo1/CoCo2/CoCo3; June 1990, p.49. Help in finding roots of quadratic equations. QUADRATC.
Ford, Steven. "CoCo and Amateur Radio"; November 1989, p.44. Discussion of ham radio as a hobby.
Ford, Steven. "Plug Into Packet"; February 1990, p.22. Exploration of packet radio.
Forster, Jim. "Moonscape"; CoCo3; January 1990, p.32. Forms moon in sky. MOON.
Foster, Leslie. "The Eighth Year of Rainbow"; July 1989, p.147. Index - July 1988 to June 1989.
Fouts, Gordon E. "The Price is Right"; CoCo3; April 1990, p.116. An aid for finding mark-up/down percentages. MARKUP.
Francis, David. "Moon Mapper"; CoCo3; March 1990, p.82. Helps you track the planet-size moons of Jupiter. GALISAT3.
Francisco, Harleen. "The Economy Printer Buffer, Part II"; July 1989, p.72. Build and troubleshoot the printer buffer.
Friedrich, John. "Story Writer"; CoCo1/CoCo2/CoCo3; July 1989, p.104. A game that challenges writing creativity. STORYWRT.
Friesen, Geoff. "Introducing BASIC+"; CoCo3; September 1989, p.38. An enhancement to BASIC. BASIC+.
Friesen, Geoff. "Superpoke"; CoCo3; June 1990, p.48. Allows multiple-byte pokes. SUPRPOKE.
Garcia, Carlos. "Searching for a Rainbow"; CoCo3; January 1990, p.36. Animates a rainbow and waterfall. RAINBOW.
George, Thomas. "The Tholean Web"; CoCo1/CoCo2/CoCo3; July 1989, p.42. Maze game where player must neutralize a force field. WEBBAS.
Giles, Douglas. "Super Quiz"; CoCo1/CoCo2/CoCo3; October 1989, p.40. Helps develop memorization skills. SUPRQUIZ.
Goldberg, Stephen. "Do the Split"; CoCo1/CoCo2/CoCo3; March 1990, p.86. Making large files easier to handle. SPLIT.
Goldberg, Stephen. "Drive With Speed"; CoCo1/CoCo2/CoCo3; February 1990, p.56. Double the speed of your OS-9 floppy drives. VFY.C.
Golias, Ruth. "He's Just a Snowman"; CoCo3; December 1989, p.20. Sing along with Frosty. FROSTY.
Goodell, Kirk. "Patchwork on the CoCo 3"; CoCo3; November 1989, p.26C. Lets you patch disks. BLASTER.
Goodman, Marty. "Adding a Disk Drive to Your CoCo Pt. 2"; April 1990, p.92. Adding disk drives to the CoCo.
Goodman, Marty. "CoCo Consultations"; July 1989, p.78.
Goodman, Marty. "CoCo Consultations"; August 1989, p.62.
Goodman, Marty. "CoCo Consultations"; October 1989, p.16.
Goodman, Marty. "CoCo Consultations"; November 1989, p.30.
Goodman, Marty. "CoCo Consultations"; December 1989, p.42. "Need a Little Support?".
Goodman, Marty. "CoCo Consultations"; January 1990, p.20. "The Disk System that Lied".
Goodman, Marty. "CoCo Consultations"; February 1990, p.59. "Disconnecting Call Waiting".
Goodman, Marty. "CoCo Consultations"; March 1990, p.74. "Converting to the CoCo".
Goodman, Marty. "CoCo Consultations"; April 1990, p.59. "Looking for Connectors".
Goodman, Marty. "CoCo Consultations"; May 1990, p.62. "OS-9 vs. BASIC".
Goodman, Marty. "CoCo Consultations"; CoCo1/CoCo2/CoCo3; June 1990, p.39. "CoCos Not up to Par".
Goodman, Marty. "Disk Drives and the Color Computer"; March 1990, p.22. Adding a floppy disk to the CoCo.
Goodman, Marty. "The OS-9 *CART Interrupt Fix"; CoCo3; November 1989, p.50. Multi-Pak and CoCo 3 fixes.
Grant, Ron. "The Schematic Scoundrel, Revisited"; CoCo1/CoCo2/CoCo3; July 1989, p.101. Adding symbol rotation for more flexibility. COCOCAD.
Hall, Greg. "Let CoCo Calculate HBUFF"; CoCo3; February 1990, p.36. A fast simple way to calculate HBUFF. HBUFF.
Haveman, Evan. "Computer Aided Design"; CoCo3; October 1989, p.59. Demonstrates computer aided design at minimal level. MINICAD.
Hegberg, Joel. "A Mazing Adventure"; CoCo1/CoCo2/CoCo3; December 1989, p.46. Maze Adventure, quest for evil dragon. THEQUEST.
Hinton, Ron. "Best Medicine for Disorderly Med. Bills"; CoCo3; February 1990, p.116. Keep the financial side of your medical history in order. MEDIC3.
Hobson, Jon. "Marynote"; CoCo1/CoCo2/CoCo3; October 1989, p.58. Plays songs and displays notes one at a time. MARYNOTE.
Hutchison, Don. "Delphi Bureau"; July 1989, p.87. GameTerm and other shareware terminal programs.
Hutchison, Don. "Delphi Bureau"; September 1989, p.42. "New Horizons".
Hutchison, Don. "Delphi Bureau"; October 1989, p.54. "Tokenized BASIC".
Hutchison, Don. "Delphi Bureau"; November 1989, p.36. "KEYSUB and WEFAX and Guide - Oh, My!".
Hutchison, Don. "Delphi Bureau"; December 1989, p.35. "The World's First".
Iacovou, Neophytos. "A Special Switch"; May 1990, p.43. Four projects using the 4PDT switch.
Jacob, David. "Let's Make a List"; CoCo3; February 1990, p.38. Create a database for your books. LISTER.
Johnson, Samuel. "EduSpell, Part II:The Dictionary"; CoCo1/CoCo2/CoCo3; July 1989, p.50. Part II in the development of a talking spelling tutor. MAINMENU.
Jones, Leroy. "Innkeeper"; CoCo1/CoCo2/CoCo3; March 1990, p.62. Catch falling drinks with trays. INNKEEP.
Kastack, Rebecca. "What Day?"; CoCo1/CoCo2/CoCo3; January 1990, p.30. Calendar for finding day of week of birthdays. WHATDAY.
Kenny, Keiran. "Booklet, Revisited"; CoCo1/CoCo2/CoCo3; May 1990, p.40. Mods to allow for bigger booklets. PATBOOK.
Kenny, Keiran. "What Is on the Agenda for Today?"; CoCo1/CoCo2/CoCo3; April 1990, p.49. Home help, scratchpad. AGENDA.
Ketchel, Kyle. "The Time Sheet"; CoCo1/CoCo2/CoCo3; October 1989, p.62. For employers. TIMESHT.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; August 1989, p.100. "The Art of Graphics Characters". DIAMOND1.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; October 1989, p.66. "More Graphics". NEWCOMER.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; December 1989, p.50. "Program Shape-Up". FLASHES.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; January 1990, p.87. "The Unfolding Block". LISTING1.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; Febru-

ary 1990, p.52. "Working in Quadrants". AOPTION.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; March 1990, p.78. "Graphics Fairyland". DIAMONDS.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; April 1990, p.86. "Go Forth and Create!". WINDMILL.
Kolar, Joseph. "BASIC Training"; CoCo1/CoCo2/CoCo3; June 1990, p.54. "The A-Option Wrap-Up". AOPTION1.
Koonce, Tim. "Observing the Social Graces"; November 1989, p.72. Introduction to file-transfer protocols.
Kraft, Michael. "As the World Turns"; CoCo1/CoCo2/CoCo3; August 1989, p.106. Draws eight graphics screens and produces animation. WORLD1.
Kuns, Eddie. "Database Report"; April 1990, p.62. "Name That Tune With UltiMusE".
Kuns, Eddie. "Database Report"; June 1990, p.92. "OS-9 Uploads Growing".
Kuntz, Steven. "The CoCo Signal"; CoCo3; March 1990, p.61. A signal for programming problems or hardware glitches. HCAT.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; December 1989, p.86. "Open Sesame!". SU.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; January 1990, p.56. "Lost and Found". VOL.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; February 1990, p.122. "Dissecting the Command Line". UDIR.C.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; March 1990, p.96. "Give It Top Priority". NICE.ASM.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; April 1990, p.113. "Conversions and Diversions". NICE.A.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; May 1990, p.30. "The OS-9 File Structure". FILES.B09.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; June 1990, p.44. "Scaling the Directory Tree". PWDIR.C.
Law, Greg. "Database Report"; March 1990, p.72. "New Uploads".
LeBlanc, Dave. "Personal Secretary"; CoCo1/CoCo2/CoCo3; December 1989, p.56. A personalized notepad for easy organization. COCOMEMO.
Mabry, George. "Lowercase and Colors Too"; CoCo3; March 1990, p.60. Adjusts the colors and actuates a true lowercase text screen. LOCASE.
Macias, David. "Mapping Your Finances"; CoCo3; November 1989, p.20. Calculates annual interest rates in percentage form, etc. AMORTIZE.
Macias, David. "Predicting Profits"; CoCo3; April 1990, p.44. Perform break-even analysis. COST.PAS.
McNeill, James. "Shopper Ease"; CoCo1/CoCo2/CoCo3; September 1989, p.62. A form for shopping lists. GROLIST.
Medlock, William. "Auto Repeat, Part 1"; CoCo1/CoCo2/CoCo3; July 1989, p.16. Add software key repeat to the CoCo 1, 2 or 3. REPEAT.
Medlock, William. "Disk Copy Utility"; CoCo1/CoCo2/CoCo3; January 1990, p.31. Copies files from one disk to another. COPY.
Medlock, William. "Key Ahead"; CoCo1/CoCo2/CoCo3; August 1989, p.14. Create type-ahead buffer for any CoCo. KEYSBIN.
Messer, Shane. "CoCo Jumble"; CoCo1/CoCo2/CoCo3; June 1990, p.50. A scrambled-word game for two players. JUMBLE2.
Messer, Shane. "Improving the Scheme of Screens"; CoCo3; January 1990, p.82. Create icons for your programs. DESIGNER.
Messer, Shane. "The Golden Retriever"; CoCo3; April 1990, p.24. Roll your own database program. COLRBASE.
Mills, Robert. "Letters & Numbers"; CoCo3; June 1990, p.48. Helps youngsters learn to recognize letters and numbers. LETRSNUM.
Minze, Bill. "Reckoning With the CoCo"; CoCo1/CoCo2/CoCo3; April 1990, p.20. Printing calculator program. CALCULAT.
Moore, Mike. "Save the Variables!"; CoCo1/CoCo2/CoCo3; January 1990, p.12. Chain BASIC programs and keep variables while editing. VARKEEP.
Mosely,John. "Winter Magic"; CoCo3; December 1989, p.12. A program for producing snow onscreen. SNOW.
Mosley, John. "3-D Grapher"; CoCo3; August 1989, p.107. Graphics using three-variable equations. GRAPH.
Mosley, John. "Kaleidoscope"; CoCo3; September 1989, p.63. Computer display of multicolor symmetric patterns. SCOPE.
Mosley, John. "Vegas at Your Fingertips"; CoCo3; June 1990, p.12. A slot machine for the CoCo 3. SLOTS.
Murphy, Stephen. "The Price of Wisdom"; February 1990, p.14. A humorous admonishment to use your manual.
Nee, William. "Assembly Line, Part 1"; CoCo1/CoCo2/CoCo3; May 1990, p.22. A way to speed up routines in ROM using complex math. SCALE1.
Nee, William. "The Assembly Line, Part 2"; CoCo1/CoCo2/CoCo3; June 1990, p.84. Rotating, mirroring and more with PMODE4. MODIFY.
Nee, William. "Machine Language Made BASIC, Part XIII"; CoCo1/CoCo2/CoCo3; July 1989, p.80. Drawing graphics lines using machine language. BINLINE.
Nee, William. "The Graphics Corner"; CoCo1/CoCo2/CoCo3; August 1989, p.36. Three ways to create color graphics on the CoCo. CLRDEMO.
Nee, William. "The Graphics Corner, Part II"; CoCo1/CoCo2/CoCo3; September 1989, p.48. PSETing numbers without using coordinates. SCRLDEMO.
Nee, William. "The Graphics Corner, Part III"; CoCo1/CoCo2/CoCo3; October 1989, p.78. A two-dimensional array that helps generate new values. NEIGHBR1.
Needham, Andre. "But it's Not Winter Yet"; CoCo1/CoCo2/CoCo3; August 1989, p.107. Creates a snowflake. SNOFLAKE.
Needham, Andre. "Fun With Fractals"; CoCo3; October 1989, p.60. Mathematically generated images. FRACTMTN.
Numa, David. "What You Should Know About C Compiler"; CoCo3; October 1989, p.82. Utility thats gets you started with cgfx functions.
Olmstead, Paul L. "Title Screen Splashdown"; CoCo1/CoCo2/CoCo3; April 1990, p.51. Animation utility. FALLING.
Onley, Ray. "An Old Code in a New Mode"; CoCo1/CoCo2/CoCo3; November 1989, p.12. Morse code training program for CoCo. CODEMSTR.
Ostrom, Steve. "A Newfangled Maze"; CoCo1/CoCo2/CoCo3; February 1990, p.50. A maze that uses numbers for directional clues. MAZEWAY.
Ostrom, Steve. "A Perfect Star"; CoCo1/CoCo2/CoCo3; March 1990, p.92. Lesson in trigonometry and CoCo graphics. TRIG1.
Ottum, J.A. "From Screen to Printed Page"; CoCo1/CoCo2/CoCo3; February 1990, p.83. A utility that lets you print straight from the screen. PRT.
Ottum, J.A. "Habla Espanol?"; CoCo1/CoCo2/CoCo3; July 1989, p.29. CoCo accepts commands in Spanish. ESPANOL.
Page, Stephen. "Flipper09"; CoCo1/CoCo2/CoCo3; December 1989, p.106. Game, try to have more colored pieces on board than opponent. FLIPER09.
Parker, Jeffrey. "OS-9 Survival Training"; August 1989, p.66. Overview of OS-9 and available hardware and software.
Parker, Jeffrey. "Play It Again, CoCo"; December 1989, p.74. A close look at MIDI.
Parker, Jeffrey. "RAINBOWfest Reporter"; September 1989, p.73. Chicago 1989 'fest report..
Parker, Jeffrey. "RAINBOWfest Reporter"; March 1990, p.34. Somerset 1989 'fest report.
Pendall, Joseph. "And Along Came a Spider"; CoCo3; April 1990, p.48. Graphics program. SPIDERS.
Pendall, Joseph. "Quickgrass"; CoCo1/CoCo2/CoCo3; January 1990, p.38. Game of cutting grass before it grows too long. QGRASS.
Pendall, Joseph. "Spray Can"; CoCo1/CoCo2/CoCo3; October 1989, p.60. Graphics program that draws a pattern using joystick button. SPRAYCAN.
Perlman, Richard. "Do-It Yourself Database, Part 4"; CoCo3; April 1990, p.12. How to use the database. DATAB.
Perlman, Richard. "Do-It-Yourself Disk Database, Part 3"; CoCo1/CoCo2/CoCo3; September 1989, p.20. How to create a full-featured disk database system. CREATE.
Phansavath, Hinh. "Running BASIC Programs Can Be a Breeze"; CoCo1/CoCo2/CoCo3; February 1990, p.36. Run BASIC programs with one keystroke. MCP.
Pittman, Larry. "Larry's Labeler"; CoCo1/CoCo2/CoCo3; May 1990, p.46. Organizing your collection of floppy disks. DIABEL.
Pollock, Grahame. "Up-Down LIST"; CoCo1/CoCo2/CoCo3; July 1989, p.106. Utility to allow scrolling through LLISTings. UPDNLIST.
Porter, John. "Mortgage"; CoCo1/CoCo2/CoCo3; March 1990, p.63. Mortgage calculation program. MORTGAGE.
Pucella, Ric. "Hi-Res Graphics"; CoCo3; November 1989, p.41. Utility to save HSCREENs. HRGCOM.
Puckett, Dale. "KISSable OS-9"; CoCo3; July 1989, p.138. "Adding Fireworks to Find". LOCATE.
Puckett, Dale. "KISSable OS-9"; August 1989, p.122. "OS-9 Makes Big Showing at Chicago".
Puckett, Dale. "KISSable OS-9"; CoCo3; September 1989, p.114. "MaxIc in Multi-Vue". MAXIC.
Puckett, Dale. "KISSable OS-9"; CoCo3; October 1989, p.110. "More on MaxIc and OS-9 Hits the Mac". TANDY.
Puckett, Dale. "KISSable OS-9"; CoCo3; November 1989, p.112. "Clearing the Board". GETICON.
Puckett, Dale. "KISSable OS-9"; December 1989, p.110. "OS-9 Takes Bean Town".
Puckett, Dale. "KISSable OS-9"; January 1990, p.117. "Are Your Programs Headed for a Breakdown?".
Puckett, Dale. "KISSable OS-9"; March 1990, p.65. "Rumors from Rainbowfest".
Puckett, Dale. "KISSable OS-9"; CoCo3; April 1990, p.52. "A New Look for OS-9". MVFINANCE.
Quellhorst, George. "Peg Me!"; CoCo3; December 1989, p.26. CoCo version of Hi-Q. COCO-Q.
Reichert, Kevin. "Captivating Captions"; CoCo3; November 1989, p.58. Makes labels for photos. CAPTION.
Ricketts, Steve. "To the Rescue"; CoCo1/CoCo2/CoCo3; March 1990, p.54. Aid for lost files on crashed disks. COCOCLN.
Ries, Richard. "Carte Blanche"; CoCo3; March 1990, p.118. Menu-building program for BASIC09. CARTE_BLANCH.
Ries, Richard. "Printing the Unprintable"; CoCo1/CoCo2/CoCo3; December 1989, p.121. A filter program for odd characters. READ.B.
Rodriguez, Alejandro. "No Smoking!"; CoCo3; November 1989, p.40. Graphics animation of No Smoking sign. NOSMOKE.
Rumpel, Kathy. "Balancing the Budget"; CoCo1/CoCo2/CoCo3; February 1990, p.40. Print a journal for your accounting needs. JOURNAL.
Rumpel, Kathy. "Steady Aim Fire"; CoCo3; April 1990, p.50. Shoot-em-up game. BIRD.
Saksa, Jonathan. "Do You Have The Time?"; CoCo3; January 1990, p.46. A calendar program to help you organize your time. CALENDAR.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; July 1989, p.91. "Getting the Whole Picture on Fractions". FRACTION.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; August 1989, p.104. "More Time Applications". REALTIME.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; September 1989, p.66. "CoCo Teaches Kids to Just Say No". NODRUGS.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; October 1989, p.48. "Meteor Storm 3". METEOR3.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; November 1989, p.54. Machine Language Tricks from a BASIC Game: Star Siege II. SIEGE2.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; December 1989, p.60. "Learning Letters". UPLOCASE.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; January 1990, p.42. "Learn to Give and Take". DRILLER3.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; February 1990, p.62. "Music Class 101". MUSIC101.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; March 1990, p.12. "Right on Time". WATCH.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; April 1990, p.118. "It Strikes a Chord". MUSIC102.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; May 1990, p.36. "A Real Clef Hanger". MUSIC103.
Scerbo, Fred. "Wishing Well"; CoCo1/CoCo2/CoCo3; June 1990, p.22. "Learning Letter Sequence". BETWEEN.
Seats, Darrin. "The Memo Maker"; CoCo1/CoCo2/CoCo3; January 1990, p.37. Put notes on disk. MEMOMAKE.
Severs, Roger. "Keeping a Tab on Your Tap"; CoCo1/CoCo2/CoCo3; April 1990, p.48. Figuring water bills. WATER.
Shaulis, Jerry. "Bank & Budget"; CoCo1/CoCo2/CoCo3; February 1990, p.74. Helps maintain your checkbook. CHECK1.
Speight, Kevin. "Mind Master"; CoCo3; September 1989, p.62. Selects a four-digit code for you to break. MINDMSTR.
Spiller, Jeremy & Spiller, Marty. "The Mandelbrot Bug and CoCo 3 Microscope"; CoCo3; January 1990, p.76. A geometric look at chaos. MANDEL.
Staff. "Anniversary Special: One-Liner Insert"; CoCo1/CoCo2/CoCo3; July 1989, p.131. A collection of one-liners.
Staff. "Did You Hear the One About Hints & Tips?"; January 1990, p.60. Hints, tips and one-liners.
Staff. "Reader Survey"; November 1989, p.124. General survey of CoCo readers' use and opinions..
Staff. "The Heat is On!"; July 1989, p.26. A midyear buyers guide to new games and game hardware.
Stakelin, James. "The Base Converter"; CoCo1/CoCo2/CoCo3; January 1990, p.34. Converts number bases quickly and easily. CONVERT.
Stanwood, Ron. "Color Your CoCo World"; CoCo3; July 1989, p.66. Utility to transfer PMODE 3 & 4 screens to CoCo 3 HSCREENs. MULTIRES.
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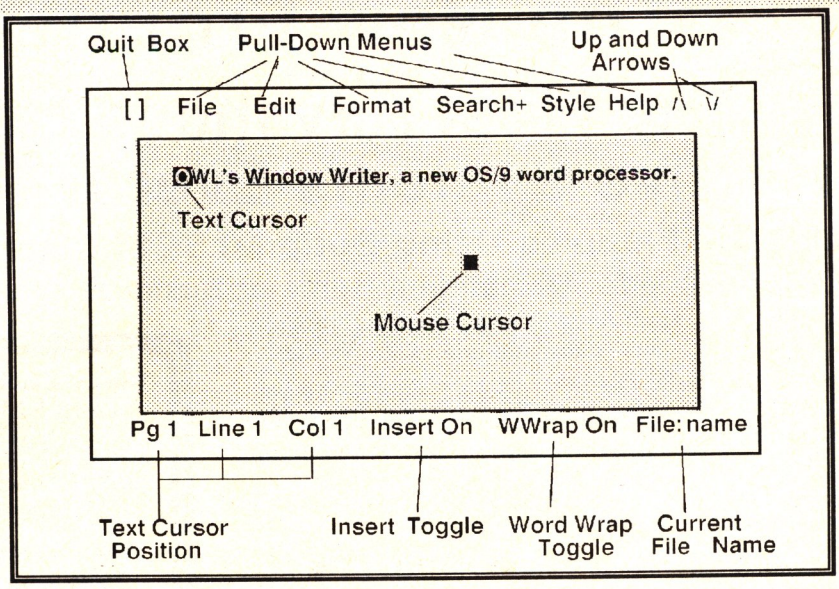
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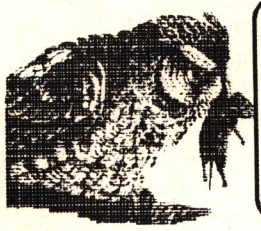

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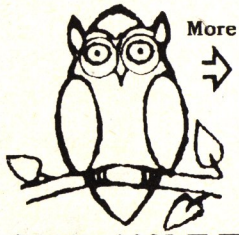

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The Missing Link

by Greg Law
Technical Editor

Those of you who read my column in the May and June issues may have realized that a piece of the puzzle is missing. While the information given is correct, the overall picture is simplified. We let OS-9 do most of the work for us as we skipped the details of the file descriptors. As I demonstrated, the dot and dot-dot entries in the directories are the forward and backward links in the directory chain. What I didn't mention is the file descriptor that sits in the middle, between the two.

Using the same figures for the disk we created last month, the true representation looks like Figure 1. The entries in the directory tell us the name of the file and the logical sector number of the file descriptor. The file descriptor contains the actual details such as the attributes and the file size.

The attributes for a file or a directory tell the operating system how to access the file. The directory attribute tells the operating system whether the file is a regular file or a directory. If the directory attribute is set, the file is a directory; otherwise it is a regular file. The sharable attribute (more properly, the non-sharable attribute) tells the operating system whether or not two or more programs or users can access the file or directory at the same time. The execution attribute tells the operating system whether or not a normal file can be executed as a program. The read and write attributes tell the operating system whether or not the file can be written to or read from.

All of these attributes play an important role in the file structure. For example, a database could become severely corrupted if a user updated any records while it is being sorted. For this reason, the operating system allows us to set the non-sharable attribute. If another user attempts to open the file while the non-sharable attribute is set, the operating system will return a Non-Sharable File Busy Error.

The owner's user ID tells the operating system who owns, or created, the file. For the owner to access a file or directory, he or she must have read, write or execute permission by setting the owner read, write or execute attributes. Everyone else must have read, write or execute permission by setting the public read, write or execute attributes.

The modified date tells us the date and time the file or directory was updated last. The created date tells us the date the file or directory was created. I say us because the operating system provides this information for our curiosity. The file size tells the operating system the number of bytes stored in the file, which is 128 bytes for the root directory in our example.

The segment allocation table tells the operating system where on disk the file is located. For example, the root directory occupies seven sectors beginning at LSN 3. Even though it is only using half of the first sector (128 bytes), OS-9 allocates extra storage for directories for future expansion. The number of sectors allocated is specified in the device descriptor for the drive. This gives the directory enough room for 56 entries. Note here that the root directory currently occupies LSN $02 (the file descriptor) and LSN $03 through LSN $09. Also, the CMDS directory occupies LSN $0A (the file descriptor) and LSN $0B through LSN $12.

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

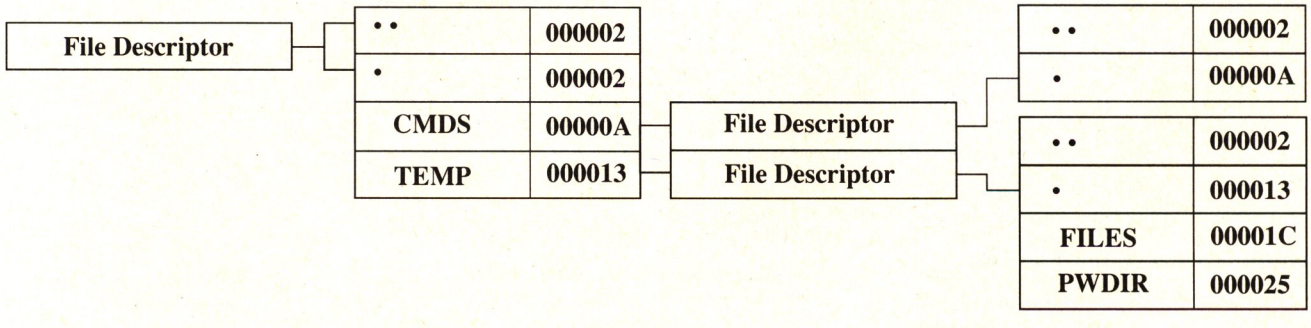

Figure 1: File Descriptor Layout

What happens when we add a 57th entry? First OS-9 attempts to expand the directory by allocating seven additional sectors starting at LSN $0A. If this were possible, the first entry in the segment list would be changed to $000003, $000E (14 sectors). However, since the CMDS directory is already occupying these sectors, it allocates the first seven sectors that are available. In this case, it starts at LSN $2D following the PWDIR directory that occupies LSN $25 (the file descriptor) and LSN $26 through LSN $2C. The second entry in the segment list, which is presently unused, is changed to $00002D, $0007.

Each file and directory is allowed to span up to 48 non-contiguous areas on the disk. If the segment list already has 48 entries and it needs to be expanded again, you will get a Segment List Full Error, and the additional data will be lost. However, it is very rare that your system will exceed the maximum number of segments.

Linking Files

The link count indicates the number of directory entries attached to the file descriptor. As mentioned earlier, the directory entry contains the filename and the logical sector number of the file descriptor. The file descriptor itself tells us where the file is located on the disk. If you wanted a duplicate file in another directory, you would normally use the copy command. This adds the filename specified to the new directory, creates a new file descriptor, and copies the contents of the original file to a new location on the disk. This isn't necessarily bad, but it does use extra disk space.

An alternative method is to add the filename to the new directory using the same LSN value and increment the link count in the file descriptor. With this method, any modifications made to the file in one directory are reflected in the other directory as well. This makes sense considering that the directory entry only tells us the name of the file and where the file descriptor is located, and all modifications are made to the file descriptor and the file itself.

When OS-9 deletes a file, it removes the entry from the directory and decrements the link count in the file descriptor. If the link count is zero, the sectors storing the file descriptor and the file itself are deallocated. If the link count is not zero, meaning there is another directory entry linked to the same file, the file descriptor and the file itself are left allocated.

Linked files are relatively safe, but there are certain pitfalls. For example, the I$Delete system call automatically detects a linked file and does not destroy the contents of the file or the file descriptor until all links are removed. Utilities that physically erase the contents of the file prior to deleting it, however, may not detect a linked file.

You can link a directory to another directory, but it is not a good idea. For example, let's assume we link the /DD/USERS/PAUL/SYS directory into the /DD/SYS directory with the directory name PAUL. Thus, /DD/USERS/PAUL/SYS and /DD/SYS/PAUL both refer to the same directory. If you delete the /DD/SYS/PAUL directory, each file within the directory is deleted since they are not linked. The attributes in the file descriptor have the directory attribute turned off and the PAUL entry in the /DD/SYS directory is removed. The first problem is that all of the files in the directory are completely deleted. The second problem is that /DD/USERS/PAUL/SYS is no longer a directory, but a regular file.

There is a third reason for not linking directories, but you'll need to put on your thinking cap to see the effects of this one. Again, assume that we have linked the directories from above and that we are using dsave to copy the /DD/SYS directory and its subdirectories to a floppy disk. First dsave copies all the files in the /DD/SYS directory and then performs a chd PAUL. After it has copied all the files in the /DD/SYS/PAUL directory and its subdirectories, it will chd .. to return to the parent directory. Which directory will be the current working directory when it issues the chd .. command? If you guess that it's /DD/SYS, guess again.

Remember that the dot-dot entry in the /DD/USERS/PAUL/SYS directory points to the /DD/USERS/PAUL directory. If we linked it into the /DD/SYS/PAUL directory, the dot-dot entry remains the same. Therefore, dsave will copy both the /DD/SYS directory as well as the /DD/USERS/PAUL directory and all of their subdirectories.

There are also cases where linking a directory within another directory can lead to dsave recursively backing up that directory. Let's assume that we link the /DD/SYS directory into the /DD/USERS/PAUL/SYS directory. If you run dsave to backup all or part of the disk, it goes to the /DD/USERS/PAUL/SYS directory as expected. However, when it performs the chd .. command, it returns to the /DD directory and starts backing up each of these directories again. It does this each and every time it reaches the /DD/USERS/PAUL/SYS directory.

I don't have a listing for you this time, but we will be back on track next month. If you have a short utility you would like examined in this column, submit it to "BreakPoint" in care of THE RAINBOW.

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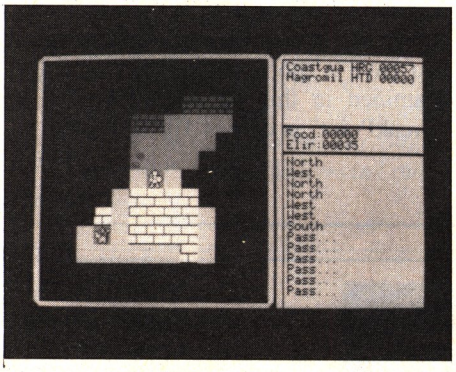
Software CoCo 3

The Seventh Link— For an "Out of This World" Adventure

Have you been waiting for an Adventure that is not only exciting, but also keeps you playing for hours on end? Try *The Seventh Link*! You can't imagine what this program is like until you try it!

It seems as though (so the records say) a few billion years ago there was a robotic ship sent out to find a lush, tropical planet for a new civilization. Somehow something went wrong and the ship sent back pictures of what it was looking for and not what it found. When a cargo ship found the robot ship, the ship discovered a protosystem of swirling gasses. The cargo ship's fusion engineer created a small device made of seven superconductor wires, which allowed the cargo ship's crew to sleep for the billions of years it would take for the planet to become habitable. However, when the last wire is gone, the planet (Elira) will slowly start to die. Your job? To save it! You will travel to other worlds, through cities and deep into 3-D dungeons.

I hope you are ready for an Adventure of this size. I got it in June of 89 and am still



just getting past the halfway mark. However, if you have played other Adventures and are familiar with how they work, then I urge you to get this one.

The Seventh Link contains three disks with really neat labels, two double-sided maps of all four planets, and a very nicely done manual explaining races, history and some of the spells. *The Seventh Link* also comes with one double-sided reference card and a strip of simulated superconductor wire.

You will need two blank disks to get started; one disk creates backups of the two data disks (one being Elira and the other the Dungeon) in order to create a personalized character who travels through the game. The only thing I don't like about the program is that it is copy-protected. However, that hasn't posed a problem so far.

Once you boot *The Seventh Link*, the title screen appears, flashing in a 3-D effect while it waits for you to insert the Elira disk. It also plays a small music clip that was created with the program *Studio Works*. After this musical introduction, a screen pops up and you create a character. You name it, give it a race, sex and personalized statistics.

The game screen comes up next. It is composed of a small box for text, a box above that shows the main character's statistics, and finally to the left is a fairly large playing box. Your character is in the middle of this box. As you move around with the arrow keys, the land "scrolls" around you. These land graphics are made up of tiles (or icons) and are nicely done. The movement, which is extremely fast and very smooth, is probably one of the program's neatest features. You can enter cities (the ones with flags waving) and move around basically the same way. In these cities you find people who may want to join your party. You then discover shops to buy food and other good stuff. When you are done, simply move out of the city. As you move along you may become engulfed in mountains; moreover, the mazes through the mountains are very tricky.

Moving merrily along you notice something is following you! Uh-oh! At this point the screen changes and there are several of these *things* shooting at you! In this combat round you get to see yourself fight. You move each of your characters around and "shoot" by simultaneously pressing A and the arrow keys for the desired direction.

During the game you will use special commands that are implemented by pressing the appropriate key — i.e., L for Look. Or if there isn't an assigned key for the command, you can try the Non-Key feature, which lets you enter the command. Sometimes you will stumble upon treasure chests. To see what you have discovered, press I. This brings up a screen that lets you drop, use and sell objects.

And then there are dungeons — my personal favorite! When you enter one the screen changes, and you see a forward view (you move forward most of the time). If you want to go right, turn right and go forward. This is an extremely good example of what the CoCo can do when used the right way!

Often reviewers protest that there are so many features in a program they can't possibly write about them all. Such is the case with *The Seventh Link*. My suggestion: Buy It! In my opinion it is one of the best Adventure games for the CoCo.

I commend Dave Triggerson and Jeff Noyle on this program. I hope to see more products from them.

(Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada, 416-877-8149; $38 in U.S. or $48 Cdn., $2.50 S/H)

— Shane Messer

Software CoCo 1 2 & 3

Morse CW — Morse Code Tutor On a Disk

Have you ever listened to transmission of Morse Code and wondered how anyone could decipher the seemingly random clicks and beeps? I've seen plenty of movies depicting a passenger sending an SOS from a sinking ship, who is relying on somebody being able to understand the distress signal. Would you be able to translate the urgent message?

To the rescue comes Second City Software with *Morse CW*, a Morse Code software tutorial for the CoCo written by John Crawford. The CW stands for Continuous Wave. With a brief three-page manual containing helpful hints, the character code table and an explanation of menu functions, this package keeps excess baggage to a minimum.

The program allows you to make files that can be saved then printed to the screen with the encoded sounds using the code file as CW and play options. These functions are handy for learning common phrases. To be tested on random 5-block characters, you can select random alphabet, random numbers or random punctuation.

If you have forgotten the name of a file you want to load, you can use the disk

Sugar Software

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Set #13 Several Courier fonts;
Set #14 Modern and Screen;
Set #15 Tektron and Prestige.

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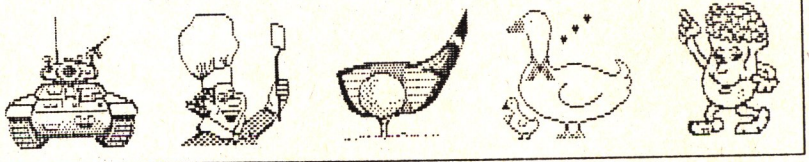

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All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add $1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add $5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

directory option. The disk directory lists only those files with an extension of .MCW. Files saved by this program have the .MCW extension.

Keys 1 through 7 set the speed at which you are tested. The speed varies from five to twenty words per minute.

The code table is split in two pages, making it awkward to use. I found errors in the code table while trying to decipher some text a co-worker had entered. A couple of code translations were incomplete — J and O are missing a dash. My suggestion is to correct the code table, print it on one page and tighten it up so users don't need a ruler to look up a code.

Morse CW teaches you how to read International Morse Code, if you invest the time and energy. With a little practice I was able to increase my speed. I recommend this program to those beginning a hobby in ham radio or another communication field that requires knowledge of Morse Code.

(Second City Software, P.O. Box 72956, Roselle, IL 60172, 312-653-5610; $19.95 plus $2.50 S/H)

—Tony Olive

Software CoCo 1 2 & 3

Joy — Fire Up that Soldering Iron!

Have you ever noticed that game programs use joysticks in two different ways? This may be because joysticks come in two varieties. One type of joystick, the analog joystick, allows smooth control over its entire range of motion. This is the kind of joystick used by the CoCo. The digital joystick, on the other hand, is a directional switch — control is on/off. The digital joystick is used in some coin-operated video games, but it is most commonly used with 8-bit Atari and Commodore computers and most home video games. In fact, the de-facto standard among digital joysticks is the Atari joystick popularized by the Atari 2600, the grandfather of home video game machines.

Since analog joysticks offer more control than their digital relatives, it's easy to think they're more superior. You may forget the advantages of digital joysticks for certain kinds of games. I can't imagine trying to play Polaris or use a paint program with a digital joystick; but, consider maze games such as *PacMan*. Here the joystick is only used to steer in one of four directions. An Atari joystick would be a definite advantage with some games. Besides, many of us have a couple of spare Atari joysticks collecting dust in a closet or attic just waiting to become part of our CoCo equipment.

Digital joysticks have limited advantages and they're cheap (or free) and plentiful. What good is that? The CoCo is designed to use *only* analog joysticks. That's where *Joy* from B&B Software comes in. *Joy* comes with a complete set of instructions telling you how to adapt a digital joystick adapter for the CoCo. The device allows you to use Atari joysticks with your CoCo and takes advantage of their improved playability for certain games.

That's the good news. Mixed in is some not-so-good news. First, the plans are on disk, which doesn't sound bad at first, but delivering plans on disk doesn't make much sense. A simple set of well-drawn diagrams accompanied by written instructions would be easier to use. I don't normally fire up my soldering iron on my computer's desk, so building the adapter involved clearing the desk and moving my soldering equipment into the computer room and working in front of the CoCo — which wasn't dangerous, just inconvenient. Then there is the matter of the parts list. For instance, I had to run *Joy* and locate the Parts screen so that I could copy the list of parts onto a piece of paper to bring with me to Radio Shack. Fortunately all the parts required are standard Radio Shack fare and are inexpensive. It just seems odd I had to copy a list from the computer screen when the list could just as easily been printed in the first place.

While I'm picking at the program, the required 9-pin connector is a crimp-type connector, which is more difficult to work with than a standard 9-pin solder connector. Either type works, but the solder type is easier to solder wires to. Also, starting with the first screen after the opening title, I ran into typographical and spelling errors. These things scare me. I wonder if mistakes could creep into other screens?

The circuit is relatively simple in that anyone who is likely to own a soldering iron is capable of building it. The only construction problems I had were no fault of the instructions: The holes in the circuit board are too large for the wire leads you solder in them, making the soldering job a little harder than it could have been.

In defense of B&B, using a standard circuit board is the best choice. Speaking of good choices, B&B is thoughtful enough to include a case in its plans. I hate making a simple project only to discover I spend twice as much time trying to find a case to finish it off. The B&B adapter plans are really complete in that respect.

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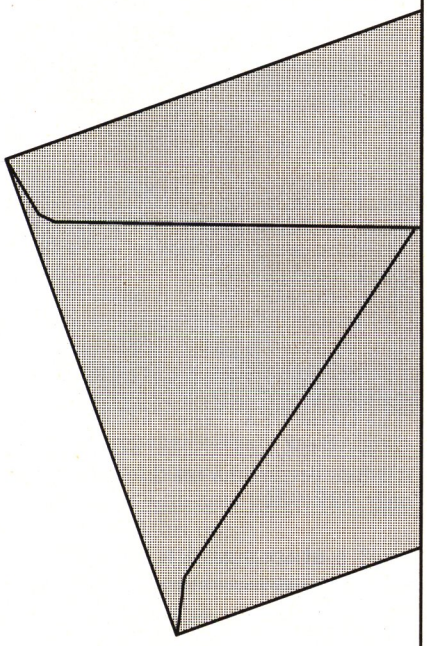

The other good news is the adapter works as advertised. It's simple to use and effective. In fact, my son adopted it right after I finished building and testing it. He began a thorough test and has had no problems whatsoever. He really prefers using it for some of his games.

What's the final verdict? I'm not sure. The adapter works well and the plans are usable if slightly flawed. Unfortunately the delivery method is inappropriate. B&B could improve the product by eliminating the disk of display screens and replacing it with three or four sheets of good line drawings and a set of printed instructions. But, it isn't *that* bad the way it is, especially considering its price. For that kind of money I wouldn't expect any more than what B&B delivers: a working adapter that a novice solderer can build in less than an hour. Plus the company sells it for a fraction of what I'd expect to pay — so ignore the rough edges. If you have games that would work better with digital joysticks, contact B&B and build its adapter. Then enjoy your work.

Editor's Note: B&B Software sells a hardcopy of *Joy* for $6.50

(B&B Software, 1637 Hanchette N.W., Grand Rapids, MI 49504, 800-237-2409; $6)

— Don McGarry

Software CoCo 3

Wild & MV — Directory Assistants for OS-9

Missing from OS-9 Level II, yet very much needed, is the ability to use wildcards in a long pathname. Suppose you are writing a book using OS-9 for file storage and you want to list all files associated with Chapter 1. Maybe you know you have named some `ch1start`, `ch1next`, `ch1middle` and `ch1end`. With a wildcard, the command might look like `list ch1*` rather than four separate command lines. Even more advantageous, suppose you are unsure if a fifth file named `ch1more` exists and you want the computer to search for it, looking not only in the directory you know about, but also in all its subdirectories! In this example, I would enter the command line:

```
wild -r list /d1/ch1* >/p
```

`wild` and `list` tell OS-9 to use wildcard options in the existing `list` command. `-r` tells it I was unsure if the files were in the directory shown or in its subdirectories, so search both ways. `>/p` is the normal redirection of output to the printer; and `/d1/ch1*` tells OS-9 only Drive 1 is to be accessed and that the file and/or directory names to be worked on must begin with `ch1`.

Wild performs this type of operation for any valid command or utility in your OS-9 library, and does so while having wildcard options for the source file and/or directory and also the destination file and/or directory. It contains many more options, but I'll let those be surprises for the new owner — rest assured they do work properly. I tried all my usual "crash this program" tricks on the program and was unable to crash it or find any bugs. However, there is a confusing error in the manual where the `-o` and `-q` subcommand options are both given inconsistently, although they are really the same option!

Wild comes with *MV*, a utility that allows files and/or subdirectories to be easily and quickly moved to other locations in your directory tree. This Burke & Burke package also includes `trash`, a utility that moves the files you intend to delete to a new subdirectory called (what else?) `TRASH`. This directory can then be deleted later with a single command. Why do it that way? Well, many of us (even including this super-perfect programmer) have deleted a file part way through a programming session only to realize we deleted the wrong file. (I have pulled out many a non-existent hair!) Now I simply send the file to `TRASH` and don't bother "emptying the trash" until the end of the session.

This package includes two other utilities that are not mentioned in the manual or even the documentation file present on the disk. So I phoned Burke & Burke and learned three things. First, this company provides courteous and competent technical support to its customers. (I did not identify myself as a RAINBOW reviewer until after receiving answers to a whole list of questions.) The second point is that it is Burke & Burke policy to place a short help file in each utility it sells. Simply substitute `-?` for an option entry on the command line to display the notes. Lastly I learned what the two mysterious extra utilities do.

`fcheck` allows you to check a storage device (floppy or hard disk) for file fragmentation. For instance, consider a disk containing text files being edited. Each time one is edited, its length may change. As that happens, parts of the file become scattered to unused portions of the disk; the file is said to have become fragmented. No

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problem! The operating system supposedly knows where the pieces are, right? But if fragmentation is bad enough, the disk access time would become lengthy and you may even be unable to get the file. `fcheck` tells you whether you should perform cleanup operations on the disk. It is a *must* for hard-disk users, but it's also convenient for those using floppies.

The other utility, `zap`, allows you to remove a file directory entry without releasing its allocated sectors. This is useful when you are repairing a damaged file and want to retain the sectors undisturbed while reissuing the filename.

While *Wild & MV* performs similar housekeeping chores as r3 Systems' *pt*, each has options not available with the other. The overlap is minor compared to the convenience of being able to use two different approaches to OS-9 file and directory maintenance chores.

Because it is highly useful yet low-priced, I'll keep *Wild & MV* in my OS-9 library.

(Burke & Burke, P.O. Box 58342, Renton, WA 98058, 800-237-2409; $19.95 plus $3 S/H in U.S., $4 S/H in Canada)

— Larry Elman

Software CoCo 3

Presto Partner — An OS-9 Desktop for All Users

Most of us who use the OS-9 operating system on a regular basis have accumulated software for the BASIC functions of word processing, databases, spreadsheets and communication. However, there is not much applications-type software available for CoCo OS-9, at least at an affordable price. For the PC there are quite a few packages that come under the heading of desktop accessories. I am not aware of many for OS-9 other than *DeskMate* and *Multi-Vue*. And so enters a neat, inexpensive little package that meets the needs of the average home user — *Presto Partner*.

Presto Partner is a cutsy name for a serious desktop package that resides in a Level II window, has a calculator (decimal and Hex), notepad, appointment calendar and a phone book with auto-dial and ten programmable macros. *Presto Partner* is easily installed by copying the module `pp` to the `CMDS` (or any other execution) directory. When you type `pp`, *Presto Partner* creates a new window and then executes. I placed the `pp` command in my `startup` file so that *Presto Partner* automatically runs on startup. When `pp` has executed, all the data — calendar, notes, phone book — are automatically loaded. You simply tap the CLEAR key to move to the `pp` window, where you are greeted with a screen showing the current time and a calendar for the current month in the upper right-hand corner. In the left corner is a box 38 characters wide by 10 rows deep. This box is the first of seven notepads.

Using the Notepad is very simple. Select one of the notepads using ALT-down or ALT-up keys. The Notepads overlay each other so that the first line of each note is visible. Simply press the appropriate key to select the note of interest by typing it. The Notepad does not have an editor (don't cry, there really isn't a need for one). You can move around the note by using the arrow and typeover keys. This is not a problem considering the Notepad is designed for quick notes. An interesting option with any of the notepads is the built-in Calculator. Simply type the numbers to calculate, including parenthesis, and press ALT= for the answer. Pressing ALT* gives you the Hex equivalent. Finally, any one or all of the notes can be sent to the printer.

Pressing ALT-C brings up the Appointment Calendar function. When the calendar is activated, the arrow keys are used to select the date. If you press S to schedule an appointment, you are prompted for the time, the event, an option for either an audio and/or visual alarm and a reminder period (such as five days before the event). You can schedule the event for the day, month and year. The reminder option is very useful. I have been setting my calendar with three-day reminders. On booting my CoCo each day, I first move to the window running *Presto Partner*, and there in a separate overlay window are the calendar reminders. By the way, you can always tell what days have appointments scheduled by the highlight color used on the calendar.

The Phone Book is what you would expect. Each entry has room for a name, two address lines and a phone number. A Lookup function is provided to search by name. It is possible to page through phone numbers by simply pressing the up and down arrow keys.

One nice feature of the Phone Book is that it lets the CoCo waltz through the phone book and automatically place a call. If you have a Hayes-compatible modem, you can look up a number and have *Presto Partner* dial the number. When the phone starts ringing, simply pick up the phone and press any key.

The last feature of *Presto Partner* is the macro capability. Ten macros can be defined (ALT 0 to ALT 9). Each macro can contain up to 10 OS-9 commands, and with any command you can have *Presto Partner* prompt you for a parameter. Here's an example:

```
ds %Enter Filename%
```

When this line is run as a macro, *Presto Partner* prompts for a filename and then runs the *Dynastar* word processor that loads *filename*.

One thing you have probably noticed by now is that I haven't said a word about loading and saving files. While these functions have been provided, they really are not necessary. *Presto Partner* automatically loads a default file, and if you choose the auto save function, the program `pp` saves every 15 minutes. The only problem I observed is the lack of a List function in the Phone Book and the inability to edit macros.

Overall, *Presto Partner* is an excellent product for those wanting the functions of a desktop accessory. The product is well-designed, easy-to-use and inexpensive. What more can you want?

(Alpha Software Technologies, 1500 I-10 Service Rd., #61, Slidel, LA 70461; $29.95, $3 S/H)

— Donald Dollberg

Software CoCo 3

CIII Fonts — A Speedball Pen for the CoCo 3

Fifteen or so years ago, as a junior in high school, I discovered a talent I possessed. My art teacher demonstrated the use of the calligraphic nibpen, and I was hooked. There wasn't yet such a thing as the chisel tip or a calligraphic marker that never needed to be dipped or refilled with ink, so I went to the stationery store across the street and bought a Speedball brand lettering set with a penholder and a handful of nibs. That Christmas my family got me the complete Speedball outfit with a Hunt's crowquill, a big bottle of ink and fifteen or twenty fancy nibs. I was in heaven; I even wrote a paper on calligraphy and illumination for English class.

As the years have passed, arthritis has made it difficult for me to hold those old pens, and most of my writing is now done from the keyboard of my CoCo. But how I miss those hand-lettered documents and their special look! Imagine my delight then, when THE RAINBOW asked me to review Coless Computer Design's *CIII Fonts* this month.

Many of my favorite letter styles are included in this program, like the Old English and Celtic alphabets. There are even Russian Cyrillic fonts!

The problem with a font package is that it's always set up for a particular graphics program, and it won't work with anything else. Not so with *CIII Fonts*. The documentation says it works with *Color Max 3* and *Color Max Deluxe* from Computize, the *Newspaper* series from Second City Software and the standard font version of *The RAT* from Diecom. Most of my testing was done with *Color Max 3*.

I priced font disks with the aid of THE RAINBOW and found that sets usually run from $20 for an eight- or ten-font disk to $30 for forty fonts. Coless offers nearly 60 fonts on three disks for $19.95, certainly a bargain. I also found that my graphics program treats it like its own proprietary fonts, so I can make outline, shadow and italic customized letters at the click of a mouse.

What, you might ask, is a font exactly? Well, the word comes from the printing business and refers to a particular typeface. The title THE RAINBOW, as printed on the cover, uses a popular font called Helvetica, which is identified by the distinctive curvy sweep on the right leg of the letter R. If you visit an art store and look at the rub-on transfer letter sheets, you'll find many of them have unusual names like Peignot and Baby Teeth, both of which are included with their proper names in the *CIII Fonts* collection. In fact, many of my favorite letter styles are included in this program, like the Old English and Celtic alphabets. There are even Russian Cyrillic fonts!

Using *CIII Fonts* is a breeze. It works on single or multiple disk systems, but you might have to do some disk swapping from time to time with one drive because the *CIII Fonts* disks are full. The fonts load into the graphics or publishing programs the same way as the built-in fonts, and you can call up to twenty type faces from each disk. These are nice designs, proportionally spaced. Some of the larger fonts may not offer all the numbers and symbols or may be strictly uppercase with numbers, but for signs and whatnot that's more than sufficient. There are fonts like Keyboard, which looks like computer keys; Skyline, resembling a cityscape with outlined Roman letters in the foreground; and Sukiyaki, ideal for setting menus to be used in a Japanese restaurant.

I'll have to say Coless *CIII Fonts* is a good buy. It has versatility, compatibility and desirability at a great price.

(Coless Computer Design, 1917 Madera Street #8, Waukesha, WI 53186, 414-549-0750; $19.95 plus $3 S/H)

— Fred Toon

Software CoCo 1 2 & 3

Space Raiders — A Speedy Invasion

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bet there will be computer companies that will continue to market new versions of the *Space Invader*-type game. *Space Raiders*, a machine language offering from Second City software, is another version of this already well-stocked item.

Moving rows of aliens creep toward and shoot at your hovering ship located at the bottom of the screen. The object is, of course, to use your joystick to avoid their bullets and to shoot them using the joystick button. You gain points as you hit them, and as your score increases you receive reserve ships. If you shoot down all the aliens before they shoot you, a new troop of them appears onscreen.

Speed and simplicity are the game's most satisfying characteristics. Its machine-language speed challenges you to stay cool by tempting you to try to keep up with the darting aliens, which is usually impossible. Once you discover that the trick is to let the aliens come to you, the game is easy, almost relaxing. Yet it can still be addicting. With less challenge, however, *Space Raiders* runs the risk of becoming bland.

Less satisfying are the sound effects. Briefly stated, the zapping lacks punch. Also, there is an extremely wide margin between the volume of the laser guns and the explosion of your ship. You must turn the volume up to hear the laser guns, then when your ship explodes, the corresponding sound proceeds to jar you out of your seat.

Space Raiders is your basic cornflake with the added crunch of machine language that makes the program faster than those written in BASIC. Keep this in mind if you want to fill an empty spot on your game shelf. The game runs on all 32K CoCos, but is fastest on the CoCo 3. It requires a joystick and supports CMP, RGB and mono video.

(Second City Software, P.O. Box 2956, Roselle, IL 60172, 708-653-5610; $16.95)

— Kelly Goff

Software CoCo 1 2 & 3

DMP-PIC Utility — It's Picture Perfect

Do you need a way to print out snazzy PMODE pictures on your CoCo? Perhaps what you need is *DMP-PIC* utility from Second City Software.

Upon running this utility, press the firebutton and the main menu appears. The program does include sample pictures, and their names are listed in a large box in the center of the screen. To load these files, just move the cursor to the desired file and press the firebutton. At this point the picture appears onscreen.

At the top of the main screen are three pull-down menus: Disk, Baud and Goodies. To view a particular menu, place the cursor on the desired menu and it appears.

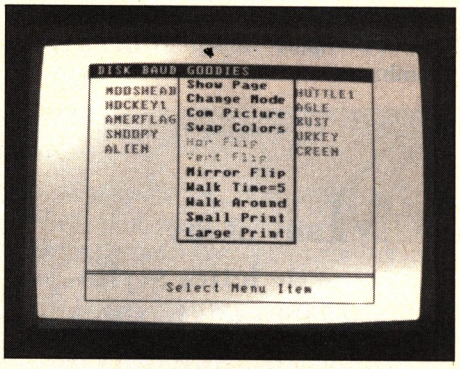
The Disk menu allows you to choose a different drive from which to load your pictures. You may also look at a new disk in the same drive or exit the program.

Now it's easy to print snazzy PMODE pictures using your CoCo and a Tandy DMP printer.

Another exciting feature in this menu is the Compress option. This compresses a file so more pictures can be stored on disk (a feature that is especially handy for two-screen pictures). Rounding things out is the Save Pic option, which allows you to re-save the picture to disk.

The Baud menu is pretty much self-explanatory: You use this menu to select the correct baud rate for your printer (e.g., 600, 1200,2400,4800, 9600).

As its name implies, the Goodies option is where all the good stuff is. For instance, you can change or swap the picture's colors; you can flip the picture both horizontally and vertically; and you can also select Mirror Flip — handy for making T-shirt iron-ons. The Small Print option allows you to print a smaller-scaled version of your picture, and Large Print prints a large picture (often more than a page so make sure the printer is set to the paper's top edge). This menu also features a Walk Around option, which is an electronic guided tour of the pictures on your drive. Moreover, you can adjust the rate at which these



pictures are shown with the Walk Times option (selecting 0 equals about 1 second, whereas 9 equals about 22 seconds of view time).

System requirements include any Color Computer with at least 64K and one disk system. The program includes a very terse, three-page manual, which is as short and sweet as *DMP-PIC* itself. One improvement would be an upgraded version that could be used for HSCREENS. Also, the grammar and spelling are a little loose in both the program and manual. (Come on guys, Happy Thanksgiving to all you *turkies*?)

Now for a confession: This is the first product I have reviewed for the CoCo (complete with a 30-minute drill on how to load a file). Yes, it's true — I'm green to the gills. So you *can believe me* when I say *DMP-PIC* is a breeze to operate!

(Second City Software, P.O. Box 72956, Roselle, IL 60172, 708-653-5610; $19.95)

— Theresa Johnson

Software CoCo 2 & 3

Killer Hawk— Battles Over the Phone Lines

In the deep darkness of outer space you are confronted and challenged by an enemy ship. It is your mission to save the universe.

Killer Hawk is a fast, strategy/arcade game designed for two people using modems or for one person against the computer. You can play the game on a CoCo 2 or 3. If you use a CoCo 2, you need to make a small modification to the filename KHAWK/

BAS. Delete Line 700, an ON ERROR GOTO command the CoCo 2 does not have.

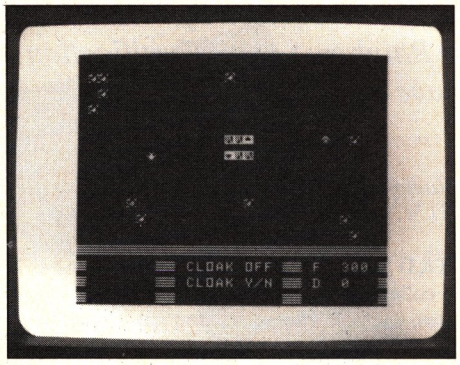
To play with a modem, you must have the modems hooked up to the serial port at the back of the CoCo. The program does not support the RS-232 Pak. If you play this way, both you and a friend must have a copy of *Killer Hawk* to play against each other. If you don't have a modem, you can still play against another CoCo using a null modem cable.

At first it is not clear how to play against the computer or a drone — the last part of the program's manual tells you how to do this. There are three different boot programs to play the game: COMPUTER, DRONE and KHAWK.

- COMPUTER/BAS: allows you to play against the computer.
- DRONE/AS: lets you play against the drone.
- KHAWK/AS: allows you to play against another person using either a modem or null cable. You can run any game you want (however, it would be nice to select the type of game from a menu within the game).

When you run one of the boot programs, you see a great-looking title screen with the name of the program KILLERHAWKS and star ships with asteroids all in graphics. I had to use a TV for composite colors because there is no RGB video support.

The program shows you a menu of nine types of ships lettered A through J. One nice feature is that the menu displays the shape of each ship next to its name. If you are playing over modems or a null modem



cable, each player can select a different ship. You are then asked if you want to have asteroids and if you want to go first. You are then ready to play the game. If you are playing using Hayes modems, you are connected. If you are using manual modems, you must turn on the carriers of the modems. The purpose of the game is to destroy your enemy's ship before it or asteroids destroy yours.

If you and your opponent are cloaked, you are invisible to each other, but you can see your own ship at all times. You are also able to see the amount of fuel and damage to each ship.

You may only fire at your opponent if you are not cloaked, but then you give away your current position. All control is from the keyboard, using the left, right, up-arrow, BREAK and ENTER keys.

Killer Hawk requires a CoCo 2 or 3 with at least one disk drive and a composite monitor for the colors. To use the Play feature against another person you also need a modem, Hayes-compatible or manual, or a null-modem cable.

If you run the directory command, you are greeted by a graphics space ship. This ship has nothing to do with game play, but it gives the disk an even more professional look. I found no bugs in *Killer Hawk*. It's fast and easy to use and well worth the $8 price tag. I highly recommend it to game lovers, especially those who use a modem.

(B&B Software, 1637 Hanchett, N.W., Grand Rapids, MI 49504, 616-453-1011; $8)

— John Cleveland, Jr.

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ACCOUNTS PAYABLE

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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

Arkanoid, a CoCo version of an arcade *Breakout*-type game. A bouncing ball careens off the walls and other solid objects; your job is to deflect the ball back with your Vaus paddle, knocking out bricks to reach the next level. There are more than 20 levels, and players can start play on any level they choose. *Arkanoid* comes on a ROM pack for CoCos 1, 2 and 3, requiring a minimum of 64K and a joystick or mouse. The game supports the CoCo 3 and RGB monitors (color TVs or RGB monitors recommended). *Taito, dist. by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $34.95: Available in Radio Shack stores nationwide, Cat. No. 26-3043.*

Mind-Roll, a 3-D game on a ROM pack in which the player becomes "the Orb of Id, ready to bump, bash, roll and crash through 10 different planes of an insane 3-D puzzle." Players slide around electric seas, bounce off invisible walls and pick up keys and amulets to escape infinite mazes, while avoiding the "dark Void of Freud." For CoCos 2 or 3, requiring 64K; joystick is optional. Supports RGB and TV. *Epyx, dist. by Tandy Corporation, 1700 One Tandy Circle, Fort Worth, TX 76102; $34.95: Available in Radio Shack stores nationwide, Cat. No. 26-3100.*

Pistol Grip Deluxe Joystick, a smooth-tracking analog four-button joystick (two firebuttons on the base, with one thumb button on top of the stick and one trigger button for the index finger). It has molded, aircraft-style finger grips, a suction base, switchable dual-control buttons, *x*- and *y*-axis trim controls and a 6-foot cable. It connects to a six-pin DIN analog game port, fitting both Color Computers and the Tandy 1000 family. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $29.95: Available in Radio Shack stores nationwide, Cat. No. 26-3123.*

Rampage, a CoCo 3 ROM pack game. In this game up to three players can work out their frustrations smashing and trashing a city as George the Big Ape, Lizzie the Lizard or Ralph the Wolf. Players can pick off helicopters and climb walls, punching holes and grabbing people and things as they climb. The monsters need to eat to keep up their energy levels: If your energy gets too low, you can turn into a human, and then your friends can eat you. *Activision, dist. by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $34.95: Available in Radio Shack stores nationwide, Cat. No. 26-3174.*

T&D Software's Grafix Disk Package Set 2, a collection of 10 disks with pictures of celebrities, cartoon characters and classic graphics files. *T&D Subscription Software, 2490 Miles Standish, Holland, MI 49424, (616) 399-9648; $35.*

Writest 3.3, a flexible test-writing program for the CoCo 1, 2 or 3. Generates matching, multiple choice, true-false or long/short tests. *Cocosoft, Beech and Broadway, Box 665, New House, NM 88121, (505) 279-6455; $15 plus $2 S/H.*

KJV on Disk #8, chapters 1 through 29 of the Book of Deuteronomy in the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

The Arcade Factory, a one-disk package containing two premade game modules. Play these games or create your own game modules using the editor programs included in this package. For the CoCo 2 or 3. *B&B Software, 1637 Hanchett NW, Grand Rapids, MI 49504, (616) 453-1011; $8.*

Barbarian Quest, a 512K arcade game for the CoCo 3. Requires a disk drive and a one- or two-button joystick. To win, recover the shattered spirit of Princess Leonore and present all the spirit fragments to the Queen. RGB or composite monitor recommended. *SPORTSware, 1251 South Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $34.*

◆F **Screenview 1.0**, a set of machine language subroutines designed to enhance the presentation of graphics material on a CoCo 1, 2 and 3. *Software Crafters, 13 Topaz Terrace, Diamond Vale, Diego Martin, Trinidad, W.I., (809) 637-5412; $8.95.*

Superfile III, a powerful, user-friendly, easy-to-use, multipurpose database. Configures to become a mailing list, checkbook, inventory, recipe, shopping list or just about any kind of database you can think of. *Gimmesoft, P.O. Box 421, Perry Hall, MD 21128, 1(800) 441-GIME; $29.95 plus $3 S/H.*

CIII D — Link, copies files from disk to disk or entire disks including OS-9 disks via a modem. Features include rename, kill, view, chat mode and calendar. *Coless Computer Design, 1917 Madera St. No. 8, Waukesha, WI 53186, (414) 549-0750; $24.95 plus $3 S/H.*

Elite Xfer, a powerful utility for file transfers between a PC and CoCo. It reads and writes CoCo disks on your PC. Allows modifying and repairing of CoCo disks via a sector-edit utility. Runs on a PC. *Elite Software, Box 11224, Pittsburgh, PA 15238, (412) 795-8492; $44.50 plus $3 S/H.*

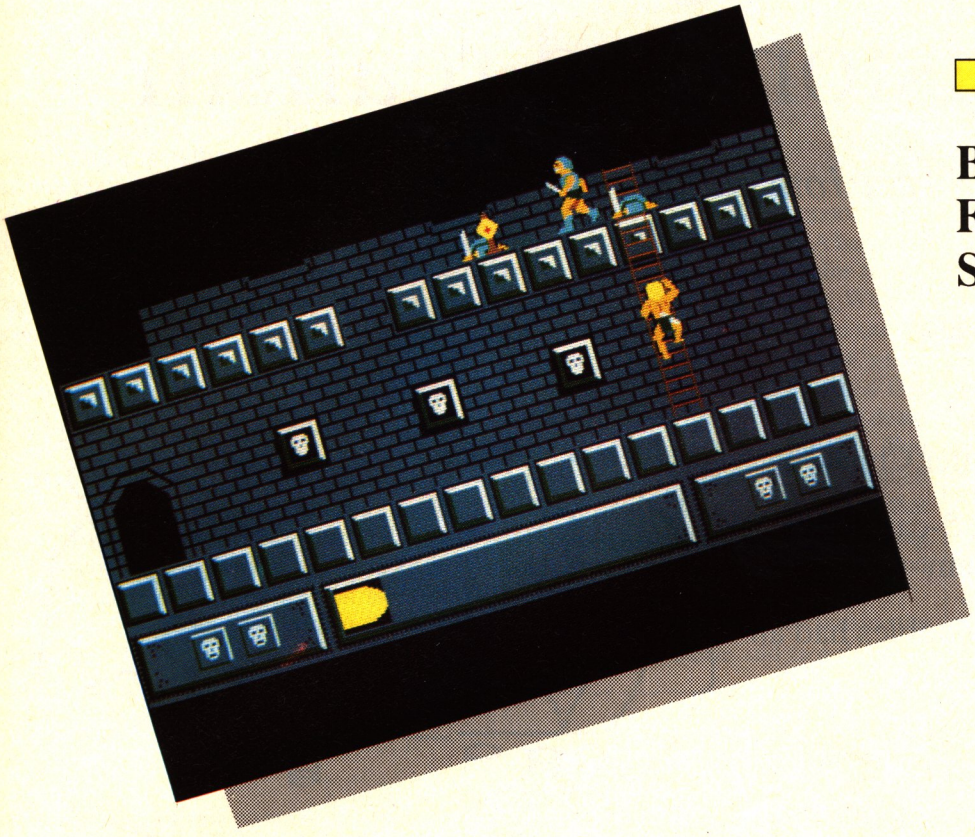
◆F **Revelation!**, a CoCo 3 software package that allows the use of 225 lines in Hi-Res graphics modes and 28 lines of text. Supports 62 macro keys, high-speed disk access, international characters, and more to make programming easier. *Robert E. Offermann II, 2447 Oak Park Way, Orlando, FL 32822, (407) 282-6272; $25.*

OS-9 Level II BBS 3.0, a set of commands and utilities for creating a Bulletin Board System. The package contains a disk with a complete bulletin board setup. The board can be modified to give it a personal touch.
Alpha Software Technologies, 1500 I-10 Service Rd., #61, Slidell, LA 70461, (504) 649-5176; $29.95 plus $3 S/H.

◆F **First product recieved from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.



Software CoCo 3

Barbarian Quest— For Serious Soul-Searching

Before the days of the CoCo 3, in the land of Lynn there lived good King Brighton. He quietly ruled his kingdom and was loved by all. He and the Queen had a daughter, Princess Leonore. His good friend and companion, Wizard Lothor, completed his happy kingdom.

All was well until neighboring King Shannon of Arth proposed that his son, Prince Griswold, marry Princess Leonore. However, King Brighton declined because of Griswold's wicked reputation. This humiliated King Shannon, and in his anger he summoned demon spirits to kill King Brighton and possess the soul of Wizard Lothor. This turned Lothor from a kind and loving wizard to one of evil and cruelty.

Lothor tried to become the new King of Lynn and take lovely Princess Leonore as his Queen, but she refused his advances. In his anger Lothor stole her soul and broke it into many pieces, hiding them in various containers he placed throughout the land. He vowed to never restore her soul until he became king and they were married. This action led Queen Brighton to seek someone in the land who could find the lost containers in order to restore Leonore's spirit. She promised the hand of her daughter to the warrior who could fulfill this dark and dangerous task. Many tried but died in the attempt. In this Adventure you play the character of Hector — and now it is your chance.

Barbarian Quest is a Hi-Res graphics Adventure arcade game written for the CoCo 3 with 512K RAM. It is supplied on a copy-protected 5¼-inch flippy disk and requires a joystick. Although it looked fair on my Amdek composite monitor, it was much better on my Tandy CM-8 RGB color monitor. The machine language game loads easily and features very colorful graphics

Interview with Paul Olmstead, owner of SPORTSware.

How long have you been programming?
Roughly ten years. I've had every model of the CoCo and consider myself to be one of the oldtimers.

When did you start SPORTSware?
Actively in 1987. My first program was *Gridiron Strategy*, a computer version of a football game based on a popular board game.

What is your most successful program?
Wargame Designer has become a big success. I receive orders from as far away as the Marshall Islands, Brazil, Australia and England. I may not be a Donald Trump, but I do have customers around the world.

Where did you get the idea for Barbarian Quest?
The idea came from two PC-based games, *Barbarian* and *Sybatour II*.

Why is it a 512K program?
Memory limitations. The space required for the graphics, screen-flipping and digitized sound does not allow the program to fit in the 128K machine.

How long did it take you to write it?
Approximately three or four months. The program was written in 100-percent assembly language. Forty different graphics screens were created using over 200 icons.

continued on Page 85

"Poker Showdown, a video game of high tension and realism"

—*The Wall Street Journal*, March 15, 1990, page 1

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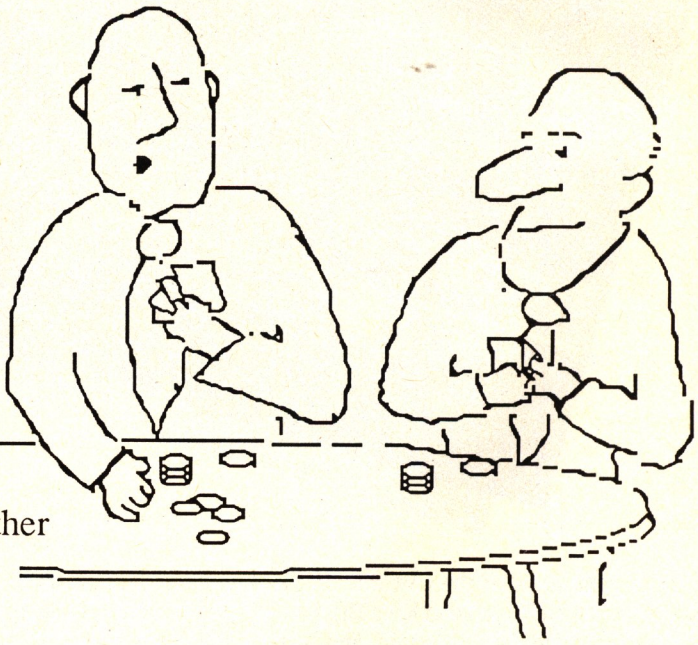

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and excellent sound effects. An easy-to-understand instruction booklet (four pages) explains all you need to know about the game.

You begin your quest just outside the castle and either walk or run across the various screens in your quest for pieces of Leonore's soul. While you can play this game with a single-button joystick, it's nearly impossible to finish. In effect, a single-button joystick uses the keyboard's space bar as the second button — this is extremely difficult to do. The action is fast and furious; therefore, a two-button joystick is really a necessity if you want to be able to fight, jump and dodge the evil warriors you confront along the way.

Depending on where you have the joystick pointed, you can stand still, walk, run, duck, climb or jump. You can also punch, stab and acquire objects. The digitized sounds are entertaining when you are fighting the evil warriors or falling into pits of fire.

Barbarian Quest includes a pause feature that I used frequently while trying to catch my breath and settle my nerves. You will be confronted with pits of fire, ladders, doors, rooms, dungeons and all sorts of other hazards during the course of play. You can acquire a total of 31 objects, 15 of which contain fragments of Leonore's soul (all 15 must be acquired to win). A bar at the bottom of the screen changes color as you successfully acquire these objects. When it has completely changed color, you can go back to the castle to restore Leonore's soul and claim her hand. Be forewarned that many of the objects result in certain death or injury when you try to acquire them. You need practice and patience to find out which ones they are, and I can assure you that you'll spend countless hours of fun trying to find out which objects are harmful and which ones you need.

There are four levels of play: outside the castle, inside the castle and two dungeon levels. You'll need to check the walls for hidden passages to enter the dungeons.

Barbarian Quest is a nice piece of software and my only complaint is that it's hard to play with a standard one-button joystick. Younger folks may have no trouble at all, however. I especially like the sound effects because the programmer did a nice job in capturing sounds that are realistic as well as humorous.

(SPORTSware, 1251 South Reynolds Rd., Suite 414, Toledo, OH 43615, 419-389-1515; $29)

—Robert Gray

What was the most difficult part of writing Barbarian Quest?

Manipulating the memory and keeping track of where the many routines were in memory while developing new code.

How did you test your program?

The children in the neighborhood are always eager to try new games. Give an eight-year old a joystick and he or she will try everything imaginable.

Why do you write programs for the CoCo?

Because of the Color Computer's low cost and also because I'm familiar with Radio Shack's products.

What are your future plans?

I'm planning a sequel entitled *Barbarian Quest: The Revenge*. It will have twice as many screens as its predecessor and will have more elaborate graphics. I also plan to enhance *War Game Designer* by increasing the number of available units to 100 per army, and by enlarging the battlefield to a width and height of three screens. It will also have digitized sounds. ❑

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Don't be left Behind!

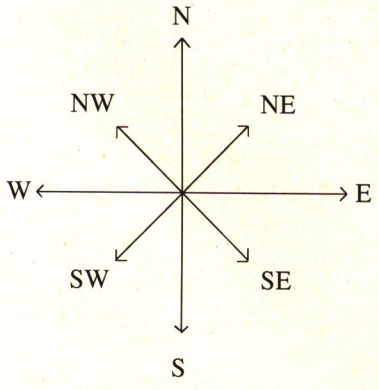
Search the World Over

by Steve Blyn
Contributing Editor

I prefer to classify Social Studies in the field of necessary life survival skills. Another of these skills is learning to use the directional on a map because we encounter maps throughout our lives. Young children usually start learning how to read maps in the classroom by discussing school and neighborhood maps. Middle-grade students advance to country and world maps. Adults often find themselves studying detailed road maps.

The normal convention is to use the top of a map as north. South is at the bottom of the map, and east and west are centered between them to the right and left, respectively. There are also the in-between directions: northwest, northeast, southwest and southeast.

The directional on most maps appears similar to the one shown below:



There are many ways to practice using this type of compass. One way is to study this magazine page and determine words in each part of the page in relation to the directional. For example, the title of this article is probably in the Northern portion of this page. Another method is to make signs to label the parts of a room with the correct directional. Students can then practice walking to and from the various locations. Still another method is to use a computer program.

Our program presents a map — of no real place — for demonstration purposes. The screen shows six points connected by lines and a compass. The student's task is to determine which direction to travel when going from one computer-selected point to another.

This type of program works best using high-resolution graphics because it includes everything needed on the screen. Lines 40 through 200 contain strings created by Joseph Kolar to draw the letters used in the program.

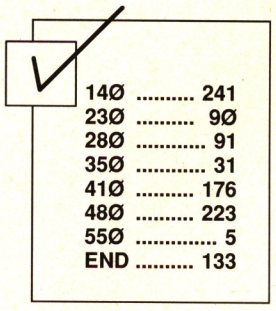
Lines 210 through 300 draw the map. Line 390 selects a random problem from among eight programmed examples to display on the screen. The student then chooses the letter preceding the correct answer to the question. Pressing the ENTER key produces another example.

The student may proceed with this program as long as he wants. There is no scorecard included since most students will be able to completely master the concept. The program may be ended by entering X in response to any question.

Should you feel adventurous, here are some ideas for program modifications: You may easily alter the map by adding a few more points and lines, and you may also add to or completely change the questions we used. ❑

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

16K Extended



The Listing: MAP

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10 REM"USING MAP DIRECTIONALS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1990"
30 CLEAR 2000:X=RND(-TIMER)
40 A$="BEHUNU2R4NU2DGL2BGBL6"
50 B$="BEHENR3HER3D4L3BGBL6"
60 C$="BU4ER2FD2GL2HBG2BL4"
70 D$="BEHU2ER3D4L3BGBL6"
80 E$="BER3U2NL2U2L4BG5BL2"
90 F$="BUR4U2NL3U2BG5BL5"
100 G$="BUR4U3HL2GDRBG3BL4"
110 H$="BUU2NU2R4NU2D2BGBL9"
120 I$="BR2BUU4BU2BD7BL8"
130 N$="BUU4F4U4BG5BL5"
140 O$="BEHU2ER2FD2GL2BGBL6"
150 R$="BEHERNH2R2NU2D2L3BGBL6"
160 S$="BU2FR2EHL2HER2FBG4BL6"
170 T$="BUR2NU4R2BDBL10"
180 W$="BUU4F2E2D4BGBL9"
```

```
190 X$="BUE2NH2NE2F2BGBL9"
200 SP$="BE4BUBG5BL5"
210 PMODE4,1:PCLS5:SCREEN1,1
220 COLOR0:LINE(50,90)-(100,90),
PSET:LINE-(50,50),PSET:LINE-(180
,50),PSET:LINE-(115,10),PSET:LIN
E-(115,70),PSET:LINE(115,10)-(50
,50),PSET
230 DRAW"C8A2S4BM53,95"+A$:DRAW"
BM100,95"+B$
240 DRAW"BM45,47"+C$:DRAW"BM190,
47"+D$
250 DRAW"BM107,6"+E$:DRAW"BM124,
70"+F$
260 CIRCLE(50,90),2,0:CIRCLE(100
,90),2:CIRCLE(115,10),2:CIRCLE(5
0,50),2,0:CIRCLE(115,70),2:CIRCL
E(180,50),2
270 LINE(0,108)-(255,110),PSET,B
F:LINE(0,126)-(255,128),PSET,BF
280 DRAW"BM210,17"+W$+SP$+SP$+SP
$+SP$+SP$+E$
290 DRAW"BM227,2"+N$:DRAW"BM227,
32"+S$
300 LINE(225,10)-(225,30),PSET:L
INE(212,20)-(238,20),PSET
310 DRAW"S4BM40,115"+W$+H$+I$+C$
+H$
320 DRAW +SP$+SP$+D$+I$+R$+E$+C$
330 DRAW +T$+I$+O$+N$+SP$+SP$+I$
+S$
340 DRAW"S8BM10,136"+A$+SP$+N$:D
RAW"BM70,136"+B$+SP$+S$
350 DRAW"BM130,136"+C$+SP$+E$:DR
AW"BM190,136"+D$+SP$+W$
360 DRAW"BM10,156"+E$+SP$+N$+E$:
DRAW"BM70,156"+F$+SP$+N$+W$
370 DRAW"BM130,156"+G$+SP$+S$+E$
:DRAW"BM190,156"+H$+SP$+S$+W$
380 FOR T=15 TO 210 STEP 60:CIRC
LE(T,145),2:CIRCLE(T,165),2:NEXT
 T
390 R=RND(8)
400 IF R=1 THEN A1$=F$:A2$=E$:A3
$="A"
410 IF R=2 THEN A1$=E$:A2$=C$:A3
$="H"
420 IF R=3 THEN A1$=A$:A2$=B$:A3
$="C"
430 IF R=4 THEN A1$=C$:A2$=B$:A3
$="G"
440 IF R=5 THEN A1$=E$:A2$=F$:A3
$="B"
450 IF R=6 THEN A1$=D$:A2$=C$:A3
$="D"
460 IF R=7 THEN A1$=B$:A2$=C$:A3
$="F"
470 IF R=8 THEN A1$=C$:A2$=E$:A3
$="E"
480 DRAW"C8S4BM194,115"+T$+O$
490 DRAW"S8BM180,112"+A1$:DRAW"B
M220,112"+A2$
500 EN$=INKEY$
510 IF EN$="A" OR EN$="B" OR EN$
="C" OR EN$="D" OR EN$="E" OR EN
$="F" OR EN$="G" OR EN$="H" OR E
N$="X" THEN 530
520 IF EN$="" THEN 500
530 IF EN$="X" THEN CLS:END
540 IF EN$=A3$ THEN PLAY"O4L25GF
ECCC"
550 IF EN$<> A3$ THEN PLAY"O1L4B
-B-"
560 AN$=INKEY$
570 IF AN$=CHR$(13) THEN 580 ELS
E 560
580 COLOR5:LINE(170,112)-(185,12
4),PSET,BF:LINE(210,112)-(225,12
4),PSET,BF:GOTO 390
590 GOTO 590
```


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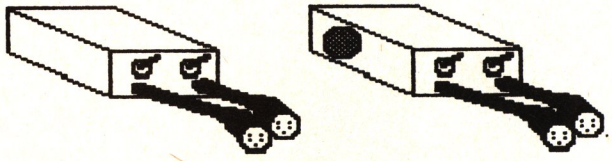

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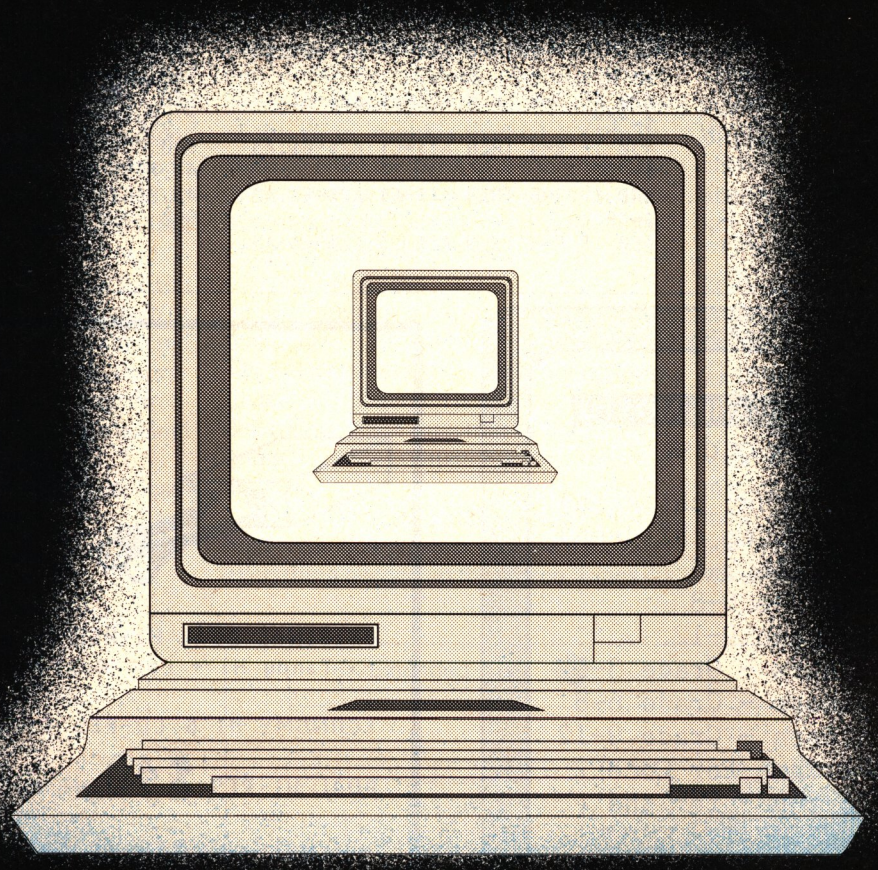

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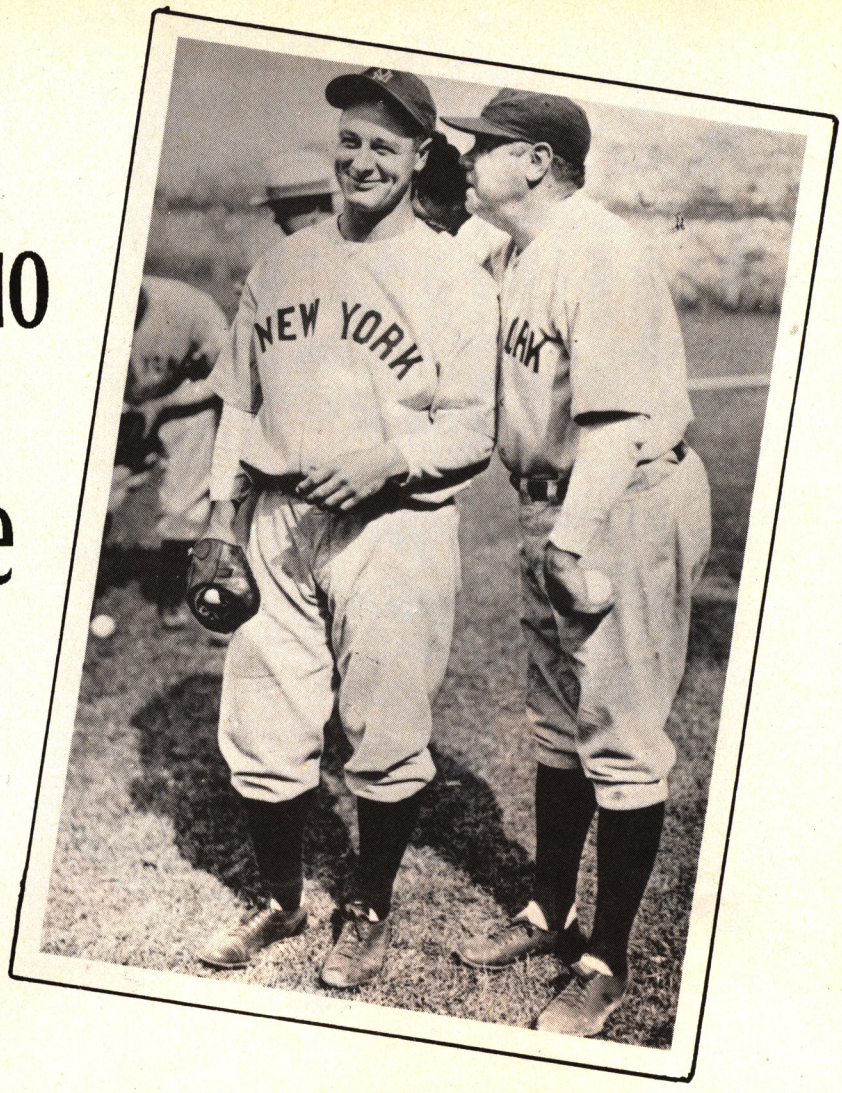

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Doin' the White/Black Knight Shuffle

Knight's Errant

by Carl James Stakelin, II

CoCo 3 users, are you ready for a unique challenge in the way of brain games? Well if you are, *Knight's Errant* is for you. The object of the game is to move all your white knights (such as in the game of chess) to where all the black knights are, then move all the black knights to where the white ones are (with the fewest number of moves of course). Shew! That's a finger full.

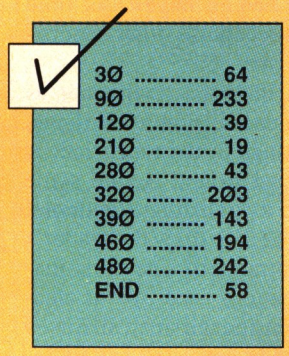
Carl James Stakelin II enjoys computer programming, writing, reading and synthesizing music. He may be contacted at 103 Old Lair Road, Cynthiana, KY 41031.

Type in, save and then run the program. First you are prompted as to whether or not you want the speed-up poke in effect. After answering, a game board appears with a 5-by-5 grid consisting of 24 knights; moreover, there is only one empty square in the center of the board. Use the arrow keys to move the cursor to the piece you want to move, then press M. Then, moving in the shape of a three-block (L), put the piece into the empty square, and the computer automatically places it. For example, the knight can move up two squares on the board, then left one square, at which point the move is finished. The knight can also jump over any piece it needs to make the move. With a little experimenting you'll pick this concept up quickly. You cannot make an illegal move, so most of you short-cutters will really be bummed.

On the right side of the screen notice the word Score and a number below it. This is the number of moves you have made in the course of your solution. When finished, you will receive your final score and just rewards. It is possible to score a 55 (which is decent), but it is -- nearly -- impossible to solve it in 45 moves or less.

Good luck with *Knight's Errant*. It is short, easy to play, and the graphics aren't too bad. Give it a try and have fun with it.

CoCo 3



```
30 ..... 64
90 ..... 233
120 ..... 39
210 ..... 19
280 ..... 43
320 ..... 203
390 ..... 143
460 ..... 194
480 ..... 242
END ..... 58
```

The Listing: KNIGHT

```
0 'COPYRIGHT 1990, FALSOFT INC.
10 CLS:HBUFF1,1296:HBUFF2,1296:H
BUFF3,1296:HBUFF4,1296:DIMA$(16)
,V(5,5),W(5,5):INPUT"INITIALIZE
SPEED-UP POKE? (Y/N)";I$:I$=LEFT
$(I$,1):IFI$="Y"THENPOKE65497,0
20 HSCREEN2:PALETTE0,32:PALETTE1
,0:PALETTE2,63:PALETTE3,16:FORY=
1TO2:HCOLORY,0:HDRAW"BM14,44R30U
2L30ND2RUR2NR24UR3URU3RURU2RU3R3
E4M+1,-3U3BM-8,+9M-2,-1M-5,+2GL2
HUR2M+4,-1BL6BD1H1U2M+9,-6M+1,-2
E2R2M+2,-1R2LUM+2,-3D2ERD2M-1,+2
D2BH2U"
30 HDRAW"BM44,42H4M-1,-4U2M+1,+2
NU14M-2,-4U8M-2,-4H2BU2NL2M+3,+1
F3D2":IFY=1THENHPAINT(34,34),2,1
ELSEHPAINT(34,34),1,2
40 IFY=1THENC=2:D=3ELSEC=1:D=2
50 HCOLORC,0:HLINE(15,43)-(43,43
),PSET:RESTORE
60 FORX=1TO50:READA,B:HSET(A,B,D
):NEXT
70 HGET(10,10)-(46,46),Y
80 HCLS0:NEXTY:HCOLOR2:HGET(100,
100)-(136,136),3
90 FORX=1TO25:READA,B,C:HPUT(A,B
)-(A+36,B+36),C:NEXT:HCOLOR2:HLI
NE(40,5)-(220,185),PSET,B:FORX=4
0TO220STEP36:HLINE(X,5)-(X,185),
PSET:NEXT:FORX=5TO185STEP36:HLIN
E(40,X)-(220,X),PSET:NEXT
100 HPRINT(30,1),"KNIGHT'S":HPRI
NT(31,3),"ERRANT":HPRINT(30,5),"
PRESS (M)":HPRINT(30,6),"TO MOVE
":HPRINT(30,7),"PIECES.":HPRINT(
30,12),"SCORE:":HPRINT(32,13),S
110 X=3:Y=3:FORZ=1TO16:READA$(Z)
:NEXT:Z=0:FORA=1TO5:FORB=1TO5:RE
ADC:W(A,B)=C:NEXTB,A:A=0:B=0:C=0
120 GOSUB410:GOSUB460
130 I$=INKEY$
140 IFI$=CHR$(8)THENX=X-1:GOSUB4
10:GOTO120
150 IFI$=CHR$(9)THENX=X+1:GOSUB4
10:GOTO120
160 IFI$=CHR$(10)THENY=Y+1:GOSUB
410:GOTO120
170 IFI$=CHR$(94)THENY=Y-1:GOSUB
410:GOTO120
180 IFI$="M"THEN200
190 GOTO120
200 Q=0:U$(1)="L":U$(2)="R":U$(3
)="D":U$(4)="U":A=X:B=Y
210 Q=Q+1:IFQ=4THEN280
220 I$=INKEY$:O=X:L=Y:X=A:Y=B:GO
SUB350:GOSUB460:X=O:Y=L
230 IFI$=CHR$(8)THENA=A-1:M=1:GO
SUB350:GOSUB340:GOTO210
240 IFI$=CHR$(9)THENA=A+1:M=2:GO
SUB350:GOSUB340:GOTO210
250 IFI$=CHR$(10)THENB=B+1:M=3:G
OSUB350:GOSUB340:GOTO210
260 IFI$=CHR$(94)THENB=B-1:M=4:G
OSUB350:GOSUB340:GOTO210
270 GOTO220
280 GOSUB400:FORZ=1TO16:IFM$=A$(
Z)THEN290ELSENEXT:SOUND1,1:Z=0:Q
=0:M$="":GOTO120
290 HGET((X-1)*36+40,(Y-1)*36+5)
-(X*36+40,Y*36+5),4:HPUT((X-1)*3
6+40,(Y-1)*36+5)-(X*36+40,Y*36+5
),3:HLINE((X-1)*36+40,(Y-1)*36+5
)-(X*36+40,Y*36+5),PSET,B:HPUT((
A-1)*36+40,(B-1)*36+5)-(A*36+40,
B*36+5),4:Q=0:Z=0:M$=""
300 HCOLOR0:HPRINT(32,13),S:S=S+
1:HCOLOR2:HPRINT(32,13),S
310 V(A,B)=HPOINT((A-1)*36+53,(B
-1)*36+18):V(X,Y)=3:X=A:Y=B
320 FORA=1TO5:FORB=1TO5:IFV(A,B)
=W(A,B) THENNEXTB,A ELSEA=0:B=0:
GOTO120
330 FORX=1TO50:PALETTE 0,RND(63)
:NEXT:PALETTE0,16:HCLS:HPRINT(10
,10),"CONGRATULATIONS!":HPRINT(1
0,12),"YOUR SCORE IS:"+STR$(S):H
PRINT(10,15),"PRESS <ENTER> TO E
ND":LINEINPUTO$:HSCREEN0:CLS:END
340 M$=M$+U$(M):RETURN
350 IFA=<1THENA=1
360 IFA=>5THENA=5
370 IFB=<1THENB=1
380 IFB=>5THENB=5
390 RETURN
400 IFHPOINT((A-1)*36+60,(B-1)*3
6+25)<>0THENZ=0:Q=0:M$="":RETURN
ELSERETURN
410 IFX=<1THENX=1
420 IFX=>5THENX=5
430 IFY=<1THENY=1
440 IFY=>5THENY=5
450 RETURN
460 HGET((X-1)*36+40,(Y-1)*36+5)
-(X*36+40,Y*36+5),4:HPUT((X-1)*3
6+40,(Y-1)*36+5)-(X*36+40,Y*36+5
),3:HPUT((X-1)*36+40,(Y-1)*36+5)
-(X*36+40,Y*36+5),4:RETURN
470 DATA 27,30,27,32,26,34,25,35
,23,36,23,38,21,39,29,29,29,31,2
8,33,27,34,25,35,25,37,23,39,31,
28,31,30,30,32,30,34,28,36,26,30
,26,18,25,18,26,19,24,18,24,19,1
8,24,17,24,17,26,14,26,23,21,24,
20,26,20,16,26,30,38,30,36,30,28
,30,28,29,32,24,32,30,39
480 DATA 32,26,32,28,32,29,32,32
,32,36,33,39,30,39,28,39,26,39,2
4,39
490 DATA 40,5,2,76,5,1,112,5,1,1
48,5,1,184,5,1,40,41,2,76,41,1,1
12,41,1,148,41,1,184,41,1,40,77,
2,76,77,2,148,77,1,184,77,1,40,1
13,2,76,113,2,112,113,2,148,113,
2,184,113,1,40,149,2,76,149,2,11
2,149,2,148,149,2,184,149,1,112,
77,3
500 DATA RDD,LDD,UUL,UUR,DRR,URR
,LLU,LLD,DDL,DDR,RUU,LUU,RRU,RRD
,ULL,DLL,2,2,2,2,2,1,1,2,2,2,1,1
,3,2,2,1,1,1,2,2,1,1,1,1,1
```

Debugging THE RAINBOW

Welcome to the "new look" for THE RAINBOW. I am sure you have noticed the new binding we have chosen for the magazine. Consider it another step in the evolution of a publication designed to serve.

Many readers have reported that THE RAINBOW is hard to set down. For some, this is a result of the enjoyment they get from reading the magazine. For others, though, it is a reflection of the way THE RAINBOW is put together — physically. The flat binding traditionally used in printing THE RAINBOW makes it difficult to lay the magazine flat. Usually the pages bow up, making reading somewhat of a task and entering listings a downright bummer. Even worse, after several sessions of opening and closing the magazine to type in a long listing, the binding weakens and sometimes pages fall out and are lost. Considering the voracious reading habits of RAINBOW readers, we decided it was time to find a solution.

The flat binding on magazines is called *perfect binding*. During RAINBOW's production, the press prints eight pages of text on each side of two large sheets of paper. The two sheets are then put together, folded and cut on three edges, making a 32-page form or *signature* (I've talked about this before). The printer stacks all the signatures one on top of the other to construct the magazine. Finally, the fourth (binding) edge is glued and a cover is folded around it. Voila! A perfect-bound magazine. Obviously, "perfect" in this case applies to how pretty it looks, *not* how well it holds up.

To solve these problems, we decided to switch THE RAINBOW to what is called a *saddle-stitch* binding. In this process, the printer cuts the 32-page forms differently. Then the signatures are folded and stacked in much the same way as you put a saddle on a horse. Finally, staples are used to hold the forms together. It doesn't look as pretty, but I doubt many of you read THE RAINBOW for its binding, eh?

The saddle-stitch process results in a much more durable binding that allows you to easily lay the magazine down flat without the hair-pulling experience of losing pages. As time goes on I'm sure we'll recognize other benefits as well.

Another important change, though not as noticeable at first, is our decision to eliminate gray *screens* from listings in the magazine. A screen is the darker background behind some text and listings. From a publishing standpoint screens are important, as they draw the reader's eye to significant information. The combination of the large dot pattern used by our electronic publishing system and the small size used for three-column listings, however, often results in fairly illegible listings. Poof! Consider them (and the associated eye-strain) gone.

Of course, we will still use screens on important text items. And, because readers report certain *colored* screens actually make reading listings easier, we will occasionally use them. But you won't have to work so hard to distinguish a comma from a period because the gray screen gets in the way.

* * * * *

A reader called recently to find out where he could buy *Disk EDTASM+*. Helping him reminded me of how important it is to get the word out about Radio Shack's Express Order Software (EOS) system. We get a lot of calls from readers looking for certain pieces of software Radio Shack stopped selling long ago. All discontinued Color Computer software sold in the past by Radio Shack is still available at its closeout price. To order discontinued Radio Shack CoCo software, just call (800) 321-3133. You can also order certain packages sold by other vendors through EOS. This is one resource the CoCo Community shouldn't overlook.

— Cray Augsburg

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(continued from page 6)

Where can I find a book about writing assembly language programs for OS-9 Level II? I've learned BASIC, BASIC09 and the *EDTASM+* style of assembly by myself with books and practice. But I still haven't found a book to help me get started on assembly for OS-9. If you don't know of such a book, why not write one? I volunteer to test it for ease of comprehension.

R. W. Kemper
491 Elm Street
Hinesville, GA 31313

You'll find upgrade information in "A PAL for Your CoCo 3" (January 1987, Page 98). Currently, there are no books specifically detailing OS-9 machine-language programming on the CoCo. However, Delphi is a good source for answers to your specific questions.

Tape-Based Desktop

Editor:

I have a tape-based 64K CoCo 2. I am looking for a tape-based desktop or interfacing programs that will do the job. Any ideas?

Randy Whitehead
P.O. Box 88
Mulberry Grove, Illinois 62262

Lobo to CoCo Interface

Editor:

I purchased a CoCo 3 about a year ago and am using a tape recorder right now. Would the disk drive I use on my LoBo Max-80 computer work on the CoCo? If so, what is required and where can I get the parts to do the job? I'm not very familiar with hooking up a disk drive to the CoCo 3.

Jeff Dobbs
40 Elliott St.
London, Ontario
Canada

Rave Reviews

Editor:

I have a CoCo 3 with 128K and am planning to upgrade to 512K. I have some serious questions about which upgrade kit is the best in your opinion. I've read all your articles about upgrades, but I still don't understand which upgrade is better. Perhaps with all the CoCo users who write to you, you might have a better idea.

I recently bought *The Works* from ColorWare and would like to add my rave review for this super word processor. I also have Tandy's *DeskMate* and *Home Publisher*, which are OK, but they can't hold a candle to *CoCo Max 10* and *Max 3*!

Gary L. Williams
3180 A Merdian Drive (F.V.)
Great Lakes, IL 60088

As RAINBOW articles have pointed out, each 512K upgrade on the market has its own advantages and disadvantages. And they all seem to work well. We don't recommend any one unit over the others as being "the best."

Looking for a Bookmark

Editor:

I'm wondering if the American Library Association has a program for inventory of books and pamphlets for home use? I have one single-side (35 track disk) drive with only 150,000 bytes — this is barely adequate byte-wise. Does anyone know of a home library inventory program?

Dale H. Watt
Route 1, Box 180
Cleveland, OK 74020

Double-Sided Drives

Editor:

I have a few questions about disk drives. First, I have a 40-track, single-sided disk drive. Most of my disks can be recorded on both sides, but my disk drive formats and records only on one side of the disk. Why is this? Second, is there a program or a way for my Star NX-1000-2 printer to print text graphics instead of PMODE graphics? Finally, can this printer print screen dump graphics in a smaller size or any size I specify (instead of a full screen dump printout)?

I'd appreciate any advice you can give on how to solve these problems.

James Ruth
128 Seymoure Ave.
Newark, NJ 07108

Taking on the Bad Guys

Editor:

I will try to keep this brief. The CoCo has taken on IBM, Macintosh and Commodore head-to-head in word processing, graphics and even desk-top publishing applications; moreover, it has proven its cost-effectiveness. Could someone please develop a good genlock and a CoCo-based edit controller so we can take on the bad guys, once again, in the desktop video revolution?

Commodore seems to rule in this area. CoCo would be a perfect alternative for a "prosumer" videographer who wants a decent graphics/titling device without a mega outlay of cash. CoCo could also control an editing VCR, thus eliminating the need for an edit controller. How about it, advertisers?

John Handis
Pittsburgh

Kudos

Editor:

I would like to thank you for printing Marty Goodman's two-part article, "Adding a Disk Drive to Your CoCo," in the March and April issues.

I'd just ordered a Drive 1 for my FD-501 case, and the drive — plus the April issue of Rainbow — arrived within a few days of each other. The drive was suppose to be an upgrade kit for the FD-501, but it arrived without instructions.

I was able to install the new drive in the case and make all the necessary connections, but I couldn't get it to operate properly. Fortunately, after reading Mr. Goodman's article I located the problem and the drive works fine.

Here is another case of THE RAINBOW making computing a little easier!

Roger L. Owens
Greenville, South Carolina

Delphi Member Services

Editor:

I would like to compliment Delphi member services. When I joined Delphi, I decided to use the invoice-direct billing method. I sent in my $25 prepayment but didn't hear anything from them.

I called and found out that my check had not arrived. They were very considerate and helpful and sent me another membership agreement form, which I completed and returned promptly. After they received it, I was contacted not once but twice by Delphi to give me verification that payment was received and that my account had been opened.

Richard Butler
Mount Ayr, Iowa

Please Don't Tell Me What I Need

Editor:

I recently returned an expensive and reputable program because it was missing a couple of important features. Before packing it up, I spent many hours trying to find a way to get it to do what I wanted easily. I could not. Just to be sure (because I really wanted to keep it), I called the company I ordered it from to ask some questions. They confirmed my suspicions. It would not do what I asked. (I did discover a way but it was too troublesome and time consuming).

During my conversation with the company, the person I was speaking with strongly recommended that I invest in an IBM-compatible because the CoCo was not designed to do large jobs! This person said I could call a bulletin board and get more powerful shareware programs for nothing! Is this true? Have I invested in the wrong machine? Have you people been leading me

down the primrose path?

I have a CoCo 3 with 128K. I'd like 512K, but do I need it? Most of the time, no. I also have an FD-501, 5¼-inch, single-sided Drive 0. I'd like a couple of 3½-inch, 1.4-Meg drives. Do I need them? Not really. I've got a CM-8 monitor. I sometimes wish I'd bought a 8CM515, but I'm still doing fine. I could go on and on, but the point is *I didn't make a mistake*. This is a great little personal computer. I use it for me and my family. I like it. It works. Sure, it doesn't run at 20 megahertz and have 256 colors, but it works.

What I need are companies that support me with what I need. Don't tell me I've made a mistake because you don't have what I need. I realize that there are more IBM clones in the world and more money can be found selling to those people, but I neither want nor can afford to pay for more than I need.

Hampton Thomas
White Post, Virginia

Disk Copy Problem

Editor:

I have typed in a program by William F. Medlock from the "Novices Niche" column (RAINBOW, January '90). The name of the program is *Disk Copy Utility*. It is an excellent program, and I recommend it highly to anyone.

I use *ADOS-3*, which is configured to format disks in 40 tracks. I quickly found that there was a problem trying to copy a 35-track disk to 40 tracks. This disk drive hangs up. I found that when I loaded *Disk Copy* into *ADOS-3*, I could copy 35 to 40 tracks without a hitch.

I have made a minor change in the *Disk Copy* program so that instructions are printed on the screen for placing the disks in the drive before the copy utility begins. This prevents me from making mistakes that could wipe out a disk. Here are the changes I have made:

```
900 CLS:PRINT"PLACE SOURCE DISK IN #-
0"
920 PRINT"PLACE DESTINATION DISK IN
#-1"
930 PRINT"PRESS ANY KEY TO BEGIN"
940 X$=INKEY$:IF X$=""THEN 940
1000 ' COPYRIGHT 1989 FALSOFT, INC.
```

I have a problem with *ADOS-3* and wonder if anyone could help me with it. While in fast mode I cannot format a disk. The drive hangs up. I have to press CTRL-2 to switch back to slow berfore I can format the disk.

James E. Parsons
2915 Warren Avenue
Granite City, IL 62040

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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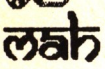

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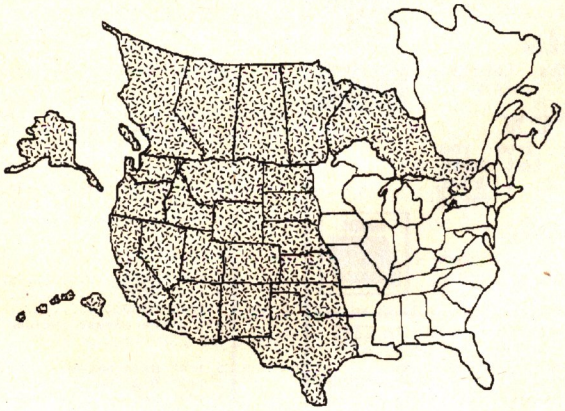

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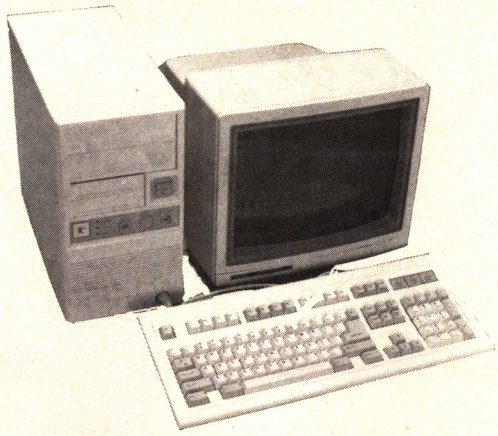

The **Tomcat** is a major improvement over the CoCo 3. The **Tomcat's TC9** 6809 CPU is over 25% faster! It uses a PC AT compatible keyboard, has two 'real' serial ports, supports a serial mouse, has a parallel printer port, has provision for 512K on board RAM or it can use a CoCo 3 512K memory upgrade, can be upgraded to 1 megabyte with the Disto 1 Meg upgrade with no soldering, it has 8 bit D to A and 8 bit A to D. 8 bit provides better sound and a higher resolution joystick, 256 verses 64, it supports an internal speaker, has the standard CoCo bus so that CoCo cartridges can be used (Disto, Eliminator, Burke&Burke Etc.), is powered by a PC style power supply. This also allows installing the board in most PC clone cases, will work with most, if not all OS9 software, will have RSDOS compatibility,and is K-Bus compatible! Whew!!!

K-Bus capability allows interfacing the **Tomcat** to the 68000 and even the 68030! By installing a 68000 CPU, the **Tomcat** becomes a dual-processing system! When in OS9 Level II mode the 68000 becomes a co-processor to the **Tomcat**, like a accelerator to Level II with a 2 or 3 fold improvement in performance!

When the 68000 is the master under OS9/68K, the **TC9** acts as a co-processor to 68K. Switching back and forth between systems will be easy and will allow a smooth transition from OS9 to OSK. It is not necessary to have OSK to get the benefits of the 68000, but it provides a smooth transition when and if you decide to make the move. You go at your own pace, upgrading as you desire, and at each point you get a significant improvement in performance, for a very slight cost.

Expansion

The world of 68K is open to you. The logical first step is to add a 68000 CPU which will immediately speed up Level II operations by several factors and opens the door to running OSK. No other additions are needed to run OSK, as OSK will run in the **TC9** memory and use **TC9** I/O. For further performance increases additional boards, memory, I/O etc. can be added to the **Tomcat**. It is even possible to have several **TC9**'s in the **Tomcat** for a multi-processing system! Memory limits are 16 Megabytes of which more than 14 Megabytes can be RAM! Because of the bus concept upgrades to future CPUs only requires adding that CPU to accomplish it. For example, you could start with a 68000 and later replace that with a 68030 and still use ALL of your other cards. When new cards such as the 68040 become available, you could add those too.

This is upgrading without having to throw anything away. Even if you eventually switched over to 68K completely the **TC9** still functions as a multi-function graphics co-processor. Because of the wide variety of K-Bus boards available and those under development, the possibilities for the future are unlimited. The **TC9 Tomcat** truly is the CoCo 4 that Tandy should have made, for that matter it could well be the CoCo 5, 6, 7, 8.....

Should you get one?

If you currently own a CoCo 3 and use it for either RSDOS or OS9 Level II the **TC9 Tomcat** is your road to the future. It will run your current software faster and give you powerful new features and performance at modest cost. You get the ability to expand at your own pace, at low cost, the way you want to do it, for your future.

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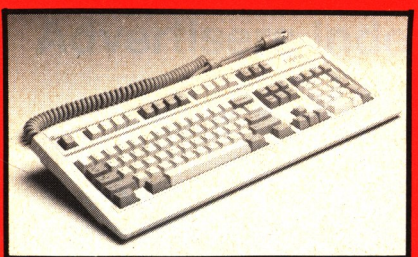
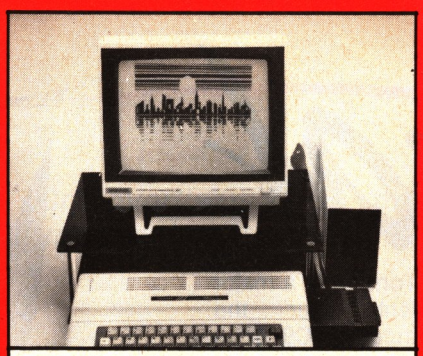


KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

KB-1	Keyboard	$98.00
KB-A	CoCo Adaptor	$89.50
KB-1A	Keyboard & Adapt.	$149.00



MAGNAVOX 7622 AMBER
OR 7652 GREEN

- 80 Column
- Built in Speaker

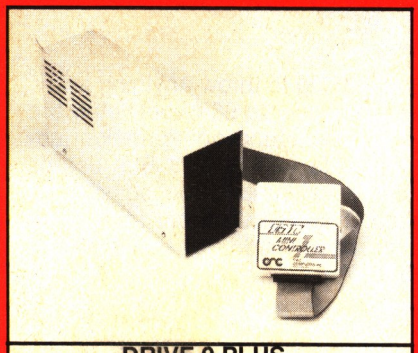
$98 (7 ship)

DISTO BOX

DC-7	Mini Controller	$ 75.00
DC-3	Super Controller	$ 98.00
DC-6	No Halt Controller	$129.00
MBA-1	3 in 1 Board	$ 69.45
MEB	Mini Expansion Bus	$ 30.00
RS232	RS-232 Port	$ 49.95
DC-3C	Clock and Parallel Port	$ 40.00

PRINTERS

STARNX-1000R	COLOR	$249.00
STARNX-1000II		$189.00
VA-1	Video Converter for CoCo 1&2	$29.45
HR-2	Dual Hi-res adapter	$39.45



DRIVE 0 PLUS

- Double sided 360K MPI 52
- Disto DC-7 controller and cable **$158.45**
- **Double Drive 0+** **$268.45**
  Drive 0 + Drive 1 (TEAC)

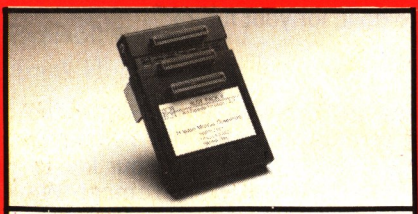
MEMORY

• 512K Bare Board	**$40**
• Populated 512K & Software	**$89**
• 1 MEG Bare Board	**$160***
• Populated 1 MEG	**$200***

*requires 512K upgrade

FLOPPY DRIVES

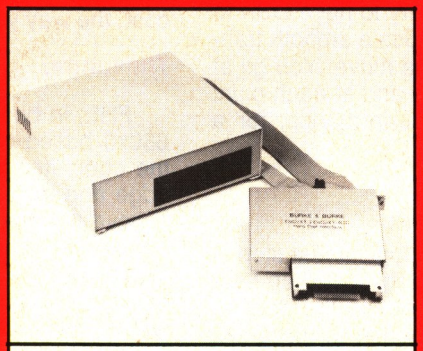
52	MPI 5¼ Full Height 40 track Double Sided 360K	$39.45
92	MPI 5¼ Full Height 80 track Double Sided 720K	$78.45
55B	TEAC 5¼ Half Height 40 track Double Sided 360K	$98
53B	TEAC 5¼ Half Height 80 track Double Sided 720K	$108
235	TEAC 3½ Half Height 80 track Double Sided 720K	$89
FR-35	Frame Fits 3½ into 5¼ space	$12
502-C	Power Cable for 502	$12



SLOT-PACK II by Chris Hawks

- replacement for multipack
- 3 slots, 2 switchable
- X slot for RS-232 for modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP-II	slot pack II	$89.45
AC-12	12 volt adaptor	$14.95



HARD DRIVE

20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface, * a heavy duty case, power supply and fan and a 1 year warranty. This 20 Meg Hard Drive will also work with Tandy and IBM clones.

RSB Access Basic thru OS-9 $39.45
FILE REPACK Un-Fragments disc $29.45

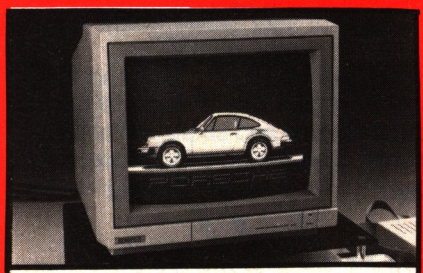
See Rainbow Reviews 8/89

HD-1	**10 Meg****	**$349**
HD-2	**20 Meg**	**$499**
HD-3	**30 Meg**	**$549**
HD-4	**40 Meg**	**$598**
HD-8	**80 Meg**	**$1,090**

*Burke & Burke **reconditioned

30 Day Money Back Guarantee

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



MAGNAVOX 1CM135

- new analog with stereo sound and high grade composite screen
- 640 X 240 resolution @ 12 MHz with .42 dot pitch

CC-3 RGB Cable $19.95
Shipping 6/16/90 **$298** ($14 ship)

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VGA Graphics Depicted

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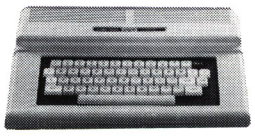
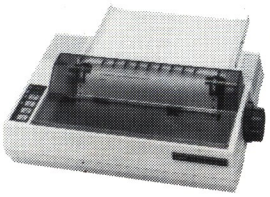
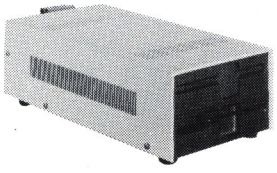


Color Computer 3
w/128K Ext. Basic $115*

Tandy 1000 SL/2 $749
Tandy 1000 TL/2 $929



DMP-133 $199*



Color Computer Disk Drive
Drive 0 $239 Drive 1 $149

TandyFax $839

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OKI Laser 400 4PPM	999.00
MODEMS	
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Radio Shack DCM-7	85.00
Practical Peripheral 1200 Baud	149.00
Practical Peripheral 2400 Baud	179.00

COLOR COMPUTER MISC.	
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Radio Shack Deluxe Keyboard Kit	24.95
HI-RES Joystick Interface	8.95
Color Computer Deluxe Mouse	44.00
Multi Pak Pal Chip for COCO 3	14.95
COCO 3 Service Manual	29.95
Serial to Parallel Converter	59.95
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Magnavox 8515 RGB Monitor	299.00
Magnavox Green or Amber Monitor	99.00
Radio Shack CM-8 RGB Monitor	249.00
Radio Shack VM-4 Green Monitor	99.00
PBJ OK COCO 3 Upgrade Board	24.95
PBJ 512K COCO 3 Upgrade	139.00
Tandy OK COCO 3 Upgrade Board	29.95
Tandy 512K COCO 3 Upgrade	149.00

COLOR COMPUTER SOFTWARE	**TAPE**	**DISK**
The Wild West(COCO3)		25.95
Worlds Of Flight	34.95	34.95
Mustang P-51 Flight Simul.	34.95	34.95
Flight 16 Flight Simul.	34.95	34.95

COCO Util II by Mark Data		39.95
COCO Max III by Colorware		79.95
Max 10 by Colorware		79.95
AutoTerm by PXE Computing	29.95	39.95
TW-80 by Spectrum (COCO3)		39.95
TeleWriter 64	49.95	59.95
TeleWriter 128		79.95
Elite Word 80		79.95
Elite Calc 3.0		69.95
CoCo 3 512K Super Ram Disk		19.95
Home Publishing by Tandy (CoCo3)		35.95
Sub Battle Sim. by Epyx (CoCo3)		26.95
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Flight Sim.II by SubLogic (CoCo3)		31.45
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